DESIGNING TECHNOLOGY SOLUTIONS WITH DATA-DRIVEN DECISION MAKING: USING CONCEPT MAPPING TO DEVELOP AN E-COMMERCE WEBSITE

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DESIGNING TECHNOLOGY SOLUTIONS WITH DATA-DRIVEN DECISION MAKING: USING CONCEPT MAPPING TO DEVELOP AN E-COMMERCE WEBSITE

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ABSTRACT

The general area addressed in this research is the use of data-driven decision-making methodologies for the design of technology solutions. The development of the MarketMaker e-commerce website is used as a case study, and the underlying factors common to more general situations are explored. These include the design of technology solutions, stakeholder groups and their decision-making approaches, and the generation and use of data to drive decisions.

The design of technology solutions is becoming increasingly common as technologies develop and move deeper into organizations, creating more needs and opportunities. Solutions consequently become more complex, and they create larger and more diverse numbers of stakeholders and decision criteria. Decision-making in these situations can be facilitated with a formal data-driven methodology to analyze and

visualize the options, minimize bias, and reveal insights.

The primary objective of this study was to generate and analyze data that could define stakeholder consensus regarding MarketMaker problems and opportunities, so that consensus-based decisions could be made about its continuing design and development. A comprehensive set of conceptual responses was gathered, and the results were analyzed and visualized. A series of maps and reports were created, producing a list of priority items the stakeholders could use to discuss and make decisions. Several conflicting perspectives were highlighted.

Among the recommendations discussed were to more effectively include external end users in the development of the MarketMaker website, as well as two potential variations on the traditional concept mapping process.

BIOGRAPHICAL SKETCH

Bryan Dailey completed his PhD after earning his MS from Cornell University. He has a diverse background in research, program management, public service delivery, technology infrastructure, and operations. He has been awarded for this research and previously for building relationships and using data analysis to align stakeholders. He enjoys collaborating with people to create opportunities and solve problems. Bryan also received his MBA from Cornell University's Johnson Graduate School of Management and his BA from Georgetown University. Originally from upstate New York, Bryan currently resides with his family in Sarasota, FL.

Sine quo non

To Dr. Donald Tobias (1945-2013).

A mentor, supervisor, advisor, and friend.

I thought I had left the PhD behind, but Don pushed me to begin again.

To my parents for always encouraging my education,

and I'm sorry my father wasn't here to see me finish my PhD.

To my family, Lisa, Jackson, Calder, and Evan for letting me work on too many evenings and weekends when the end just seemed like it would never come.

Looking forward to seeing more of you!

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Introduction

The general area being addressed in this research project is the use of data-driven decision-making methodologies for the design of technology solutions. The design of technology solutions is becoming more common as technologies develop and move deeper into organizations, creating more needs and opportunities.

Solutions consequently become more complex, and they create larger and more diverse numbers of stakeholders and decision criteria. Decision-making in these situations can be facilitated with a formal data-driven methodology that is effective and efficient.

The development of the MarketMaker e-commerce website is used as a case study in this dissertation. The website, foodmarketmaker.com, is devoted to local food systems and economic development. A background on the website is provided in this chapter, including the context within which it was developed and the purpose of its development. Subsequent challenges for the website and the broader program are then discussed, which required stakeholders to make decisions about priorities and action items.

I have been involved with the website since 2006 through my work on associated education and research programs at Land Grant Universities. I was familiar with the challenges they were experiencing, as well as with the concept mapping methodology. After discussions with MarketMaker leaders, we decided to conduct a concept mapping research project that would assist in the development of the website and serve as the research topic for my doctoral degree.

This topic ostensibly concerns the development of the MarketMaker website, and Chapter 1 focuses on the specific topic, stakeholders, and methodology used in this research, culminating in the research question. Chapter 2 addresses these same topics in a more general and theoretical level. These include the underlying factors that are common to more general situations, including: the design of technology solutions, stakeholder groups and their decision-making approaches, and the generation and use of data to drive decisions.

Chapter 3 discusses the specific concept mapping methodology used in this research. Chapter 4 presents the results of the research, and Chapter 5 presents a summary of findings, discussion, and recommendations.

The Research Topic

MarketMaker Website, Context and Purpose

MarketMaker is a website that was designed to facilitate food producers' access to markets and consumers' access to fresh food, as well as to any stakeholders or components of the food system (Carlos, Olga, Lamie, & Samuel, 2013; Conaway, 2013). MarketMaker is referred to here both as a website as well as a program. The website is part of a larger program to develop it with various stakeholders, including sponsors, researchers, educators, producers, distributers, wholesalers, retailers, and consumers.

The website facilitates the development of local food systems and economies, not only by making markets but also by facilitating other projects that integrate food systems such as food hubs, agritourism, and school food programs. The website serves as a portal for consumer information, research data, and collaboration related to local food systems. An image of the homepage at can be found in Appendix A.

The description on the website reads, "MarketMaker is a national network of states that connect farmers and fishermen with food retailers, grocery stores, processors, caterers, chefs, and consumers. It is an ever-growing partnership of Land Grant Universities, Departments of Agriculture, and food and agricultural organizations investing in a coordinated effort to build a virtual infrastructure that brings healthier, fresher, and more flavorful food to the average consumer". It was initially created at the University of Illinois at Urbana-Champaign in 2004 and has gone through

multiple ownership transitions until finally becoming a private Limited Liability Company (MarketMaker, 2018).

MarketMaker is designed to improve access both to supply and demand, making it a potentially valuable tool for economic development and improved health. The United States Department of Agriculture Economic Research Service reports that 12.3% of US households had limited access to adequate food in 2016 (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2017), but even areas with sufficient grocery stores, farmers markets, and gardens can benefit from increased supply and demand.

MarketMaker serves as a valuable data gathering tool by making available federal and state level data related to local food economies, with external data sets that are uploaded as well as aggregated data collected from users. Market research on supply and demand can allow suppliers and researchers to evaluate market opportunities and potential payoffs from investments and to help consumers locate their supply.

Some stakeholders felt that the greatest value that the site offered was the ability to research local market opportunities, while others felt that it was to assist end users in establishing a business relationship to buy and sell products and services (B. Dailey, personal communication, 2015). In order to illustrate this, two examples of MarketMaker searches in Tompkins County, NY illustrate this and can be seen in the

Appendix. Appendix B shows a search for organic apples for sale and Appendix C shows average food expenditures per household according to the 2010 census.

An important aspect of the website is that is free to end users, so it does not reduce already thin profit margins for suppliers. It inherently favors small and medium scale producers and consumers because larger entities have economies of scale that afford access to more efficient transaction tools. The MarketMaker website addresses needs so widespread and important, however, that it has been adopted in 23 states.

MarketMaker has a novel business model, where Land Grant Institutions pay a subscription fee of approximately $10,000 semiannually or $20,000 annually. Each state may have a unique agreement. Their subscription makes the site free to users, and except for logos of sponsoring institutions, it is free of advertising as well. While the cost is significant for the public institutions that pay for its availability in their state, it is considered an investment in a much-needed set of tools.

The business model has evolved over time, with the hope that the fee would eventually decrease through the revenue of an increasing number of memberships. Several other revenue streams have also been considered, including a base membership with additional features available on an à la carte basis.

MarketMaker Program, Challenges

Many communities and stakeholders recognize the value and importance of developing their local food system, but also the challenges of doing so. There are numerous types of food systems and situations where the needs and opportunities are unique. The geographies, economies, and demographic variations mean that the stakeholders have different backgrounds, perspectives, and priorities that make a common solution difficult (Feenstra, 2009; Hodgson, 2012; Martinez, 2010; Thilmany McFadden et al., 2016).

This same diversity is reflected in the value that different stakeholders see in MarketMaker. Depending on a stakeholder's need, the site is a directory of local growers, a marketplace to buy or sell goods, a data repository for research, or a host of other services. An underlying struggle among the MarketMaker stakeholders is agreement on what constitutes the core feature set of the site.

The management of the site became burdened several years ago not only with bringing in new member states, but also with funding, developing, maintaining, and marketing a growing set of features for existing member states. Recognizing the site as a developing project and being aware of the high cost to their budgets, many member states were engaged in the development of the project and wanted to see the site develop in ways that would serve the specific needs in their states.

While the members shared many common needs, enough for the existing core set of webpages, there have also been specific interests shared by smaller groups of members or piloted by individual states. Examples have included an agritourism version from Clemson University and a beef version from the University of Montana, though these examples no longer exist. Some excellent projects were executed, but as time went by, MarketMaker began to address more and more needs.

At the same time, addressing the diverse and growing stakeholder needs resulted in a busy and clunky interface. It was everything to everybody, and eventually worked well for those already familiar with the site but was less intuitive and compelling for new users. To the unfamiliar, the site could be unclear about its purpose and overwhelming with features. This sometimes constrained the site's use to the devoted and to the limited number of states where education and assistance could be provided to participants.

New York State may be the best example of this, with a dedicated staff person from the Land Grant University to make a personal connection with farmers and other users. The user base there soared to 2000 but has plateaued since the position was eliminated in 2014. The size of the active user base is critical for the success of the site in any given state, since reaching a threshold of participation is what provides value

for new users.

Some MarketMaker features are valuable on their own, without participation from other users, such as databases for market research. Others, such as the buy & sell forum, are only valuable to the extent that buyers and sellers participate. Despite the value MarketMaker is capable of providing, lack of clarity for new users, limited participation, and stretched resources have made it a struggle to realize the site's potential in some instances.

Florida MarketMaker

Nowhere are these challenges seen so clearly as in Florida. Florida is no exception to the rapidly growing trends in food systems (Hodges & Stevens, 2013; Hodges, Stevens, & Wysocki, 2014; Martinez, 2010). The average size of farms is decreasing due to new small farms, increasing demand for local food, and growing urban markets that are disconnected from the rural growing areas (NASS, 1964-2012). The University of Florida subscribed to MarketMaker in 2010 to address these needs as part of a coordinated statewide effort.

It had engaged 160 users by 2013, but that was fewer than expected (Conaway, 2013; Conaway et al., 2014). More importantly, it had not yet reached a critical mass, so while farmers saw value in the site, it had not become an essential tool for them.

Based on the disappointing participation, the University of Florida Center for Public Issues Education (PIE) received a grant from the Florida Department of Agriculture to explore the problems and make recommendations.

The study was "… conducted in an attempt to better position Florida-grown specialty crops as the choice for local consumer-based buyers." (Conaway, 2013). PIE used a qualitative focus group design including Extension Agents who were expected to promote the site and the small farmers who were in the target market for MarketMaker. The focus of the study was to gain an understanding of the participants' awareness of MarketMaker, the development of effective strategies to promote MarketMaker, and the identification of website design aspects were inhibiting its use.

The feedback from the focus groups was very negative, and surprisingly unaware or uninformed, especially given that the participants were in the target audience. Half of the participants were not aware of the site, and the others questioned its purpose and effectiveness. Other comments included criticism that it was both redundant with other existing and successful sites like Local Harvest (the website at www.localharvest.org is pictured in Appendix D), that it was attempting to address too many needs, and that the interface was difficult to navigate. Lastly, while the intent of the site seemed reasonable, there was mistrust about the backing, specifically

whether it was a corporate, academic, or government project. Presumably, none of those were viewed positively.

Perhaps just as troubling is that some participants saw any potential value of MarketMaker to be redundant with their own private websites, meaning that they saw the value purely as an extension of their online business presence. The fact that someone would come to this conclusion suggests that the other features of the site were not clear or valuable. Missing the community aspect of the site would be like visiting LinkedIn and concluding that it is no different from a personal webpage. One participant remarked "I have no idea how I stumbled on it, but I really couldn't figure out what it was for." Another said that the site was "Trying to be all things to all people and it's just too much". The fact that the site is free to participants also had to be clarified (Conaway, 2013).

The recommendations from the focus groups fell into three categories: straightforward changes and new efforts; complicated enhancements; and some reductions. Feedback in the first category had easy and broad support. A more appealing and engaging homepage, a simpler registration process, and defining and marketing to target audiences were clearly important for the success of the site (Conaway, 2013).

Some of the feedback called for additional features and improvements, such as developing a special emphasis on citrus in Florida or separate sites for consumers and producers. These suggestions seem to conflict with the same focus groups' criticisms of the existing site trying to do too much and being too complicated. Unless these types of changes are undertaken in a larger context that includes and is consistent with the overall purpose the site, they may ultimately make the site more complicated and diminish its value, especially to new users.

A final category of recommendations included things that could be removed from the site, including the market research features and logos of national participants and sponsors. While these aspects were not valued by the PIE study participants, they were valuable to other audiences and fundamental to the national program. The PIE study was limited to Florida and presumably included only a small number of people in the six focus groups (the number of participants was not disclosed). Except for the focus group format, the PIE study also did not use a formal methodology to gather or analyze feedback (Conaway, 2013).

Florida Food Connect

The PIE study led to the funding and creation of an entirely new site based on the criticisms and recommendations it recorded, called Florida Food Connect (FFC). The website at www.floridafoodconnect.com can be seen in Appendix E. Whereas the

grant recipients presented their effort as one of refining the MarketMaker site, improving some features and removing others, it in some ways appeared as a new and unrelated site to serve the same purpose. Since some of the functionality of the national site was removed, it was not merely a localized version of the national site, but a significant departure from the larger effort.

This problem was compounded by the fact the FFC site was distinct enough from the original one that both sites were maintained online. In an effort to satisfy the interests of all its stakeholders, and perhaps harness innovation among the group, the MarketMaker leadership facilitated and endorsed the new site by hosting it and providing the use of the underlying database for FFC. To visually link the two sites together, the new site simply has a small and inconspicuous logo at the bottom of the page, stating "Powered by MarketMaker."

The new FFC effort was successful in the study's highest priorities, including a simpler and more attractive interface with an easier registration process. The project was expected to have only an additive effect, since it leveraged the same database as the original site and an entry in one site shows up in both sites, though it was also expected that the use of FFC would eclipse MarketMaker (B. Dailey, personal communication, 2014). The University of Florida encouraged its usage with a statewide marketing campaign.

The lack of explanation about the two sites and their differences led to confusion and uncertainty. It appeared that the two sites were competing with each other. For those who did not already know, there was no way to know that the sites used the same database, even if the "Powered by MarketMaker" logo were noticed. This apparent competition in an already ambiguous market led to uncertainty about the future of each site.

Uncertainty led to hesitation along a spectrum of stakeholders, from individuals to organizations to the University of Florida administration (B. Dailey, personal communication, 2015). People became hesitant to invest effort or funds. While both sites were free for people to use, it required an investment of time to complete a registration and profile. Getting value out of the site for a producer typically requires profile updates to stay current throughout the growing cycles. That investment of time was difficult to justify when the site had an uncertain future.

In the end, FFC fell victim to the same problems that it was meant to address and even exacerbated them. There was a lack of clarity about the purpose of the site, no clear target audience, not enough distinction from competition, and finally, low enrollment. While FFC was more visually appealing, it offered a more limited set of features, and so was less able to compete beyond an initial impression.

Regardless of the specific reasons, participation in both Florida sites comprised a mere 300 participants after seven years of activity. This compares to over 2,000 in New York State, with comparable populations. Two thirds of the participants are in the main MarketMaker site, and just one third are in FFC. The two Florida sites likely reduced the size of their actual and potential audiences by cannibalizing each other.

For those who endeavored to improve the original site, it is perhaps difficult to understand that the effort was undermining the larger purpose of the original site. They felt that MarketMaker adopted some of the improvements they pioneered, and thereby diminished the distinguishing aspects of FFC. Defensiveness, mistrust, and protectionism resulted. The two sites created a rift between supporters and detractors and fed into dissatisfaction among many other smaller stakeholder groups. The future of FFC was dependent on the success of MarketMaker because they hosted and supported it, and yet FFC came to be seen as a potential threat to the larger project (B. Dailey, personal communication, 2015).

The Turning Point

The challenges addressed by the FFC project were not unique to Florida, however. In fact, the project helped reveal similar issues and dissatisfaction in other MarketMaker states. Stakeholders saw the improvements made by FFC and it started to pull the

national project in the same directions, despite the negative issues that were resulting. This also occurred during a period of transition for MarketMaker, when the site was being purchased from the University of Illinois by Riverside Research, a private non-profit organization. The transition was not seamless, so there was unrest among the stakeholders and the future direction was unpredictable.

For what seemed like a long time, Riverside Research was focused on the transition of the servers and fixing problems with the site. The leadership struggled with the business model, including how to keep the existing partners satisfied, how to attract new partners, and how to develop sustainable revenue streams. Communication was limited to monthly conference calls with partners, but schedules and milestones were not communicated. Stakeholders were invited to identify specific problems or improvements, and projects were addressed individually by the IT staff and internal software development cycles.

The lack of a formal process to gather feedback, process it, and communicate it to the IT team meant that there was no way to arrive at consensus about how to move the project forward. The group had worked together for approximately ten years, but consensus had not been achieved for a variety of reasons. By the time the leadership turned to developing the site in response to stakeholder interests and reconcile the rifts, the level of frustration was high (B. Dailey, personal communication, 2015).

The leadership of MarketMaker and Riverside Research recognized these challenges of being responsive to stakeholders, while addressing the challenges posed by the two sites in Florida. They also recognized that a formal process was needed to gather, analyze, and understand feedback in a way that could be implemented by the technology team. After many discussions with stakeholders at the University of Florida (UF) and Riverside Research, it was decided to move forward with a process and that I would lead it through a partnership between UF Extension and the MarketMaker Research and Evaluation Committee.

The Research Population

One of the assets of the MarketMaker website is the stakeholder group that develops and supports it, and the multiple sectors and disciplines that they represent. The diversity of perspectives enables collaboration across a spectrum of topics and makes the website relevant to a broad audience. That diversity also presents challenges when trying to work together on a focused project and make decisions. To the extent that consensus is not reached, different definitions of success can keep a project from moving forward in a coordinated and focused way. This project developed at the intersection of several stakeholder perspectives spanning across public and private sectors.

The most prevalent perspective came from the public sector, particularly from higher education, which is where the project began. The project was initiated as an internal inquiry, looking inward, but it soon broadened. Land Grant Universities were the primary partners, providing program oversight and financial support. This brought many stakeholders to the table, including researchers who were the initial impetus for the site, particularly economic research faculty. The Extension System, affiliated with the Land Grant Universities, is leveraged to deliver education and recruit participation at the local level. Public sector stakeholders also included partners at the federal level in the USDA and other partner organizations such as Farm Credit.

Other stakeholders represented the private sector. With the exception of economic research, which was ultimately conducted for the benefit of the private sector, the target audience and beneficiary of the MarketMaker site exist in the private sector. Farmers and other food producers, distributers, wholesale and retail consumers are primary users of the site, and it is designed to enable them to find and learn about each other. Up until this study, these stakeholders had not been widely included in the development of the site, however.

The website was managed by an information technology group employed by the parent company Riverside Research. Beyond the fundamental tasks of keeping the site available, functioning, and secure, their priority was the user experience and interface.

The group included website developers, and they were tasked with fixing problems as well as initiating and managing projects to develop new features that addressed stakeholder needs and ideas.

This included questions of layout and function, which were to some extent non-technical work. In addition to expansive responsibilities and a large degree of autonomy, the technology group members were employees of the parent company with neither a historical perspective of the website nor contextual understanding of food systems, which some saw as problematic (B. Dailey, personal communication, 2015).

Changes in policies, roles, and even MarketMaker ownership had strained the patience and trust between some stakeholders involved in this project. Just as the PIE Center had revealed a lack of trust from end users about the purpose behind the site (Conaway, 2013; Conaway et al., 2014), some of the participants in this research did not initially trust the intent of the study (B. Dailey, personal communication, 2016).

This was intensified by the fact that Riverside Research, the company which had taken control of MarketMaker, is a defense contractor with classified and international programs. Some questioned whether the motives of Riverside Research, in the facilitation of global food supplies, were consistent with those of the MarketMaker

partners (B. Dailey, personal communication, 2016). Gaining trust from the participants therefore required clarity about who was conducting the research and what perspective they were coming from.

Politics was also an important aspect of the complexity in this project. Hinrichs notes that the idea and definition of local agriculture is laden with politics, and there are many societal conflicts among agricultural stakeholders (Hinrichs, 2003). Some of the issues encountered on this project included divides of rural versus urban, traditional versus modern, large-scale agriculture versus small-scale agriculture, organic agriculture versus non-organic agriculture versus biotechnology, farmers versus academics and scientists. There were also disconnects between the stakeholders, the technology team, and the purposes of the website.

These divides contributed to issues of trust and made a common understanding and vision of the MarketMaker website difficult. Each group had their own priorities and ways to approach an issue. There was general agreement on the need to develop consensus on priorities and direction, but none of the groups was in a natural role to lead such an effort. While the need for the research project was clear, the starting point and path forward were complex.

This increased the need for a suitable method to gather and process feedback, and yet

a formal process or methodology was not being used. This research project therefore began with a consideration of the stakeholders, their perspectives, and how to approach the problem. A process was ultimately needed that could foster trust from the various groups and perspectives, as well as to identify and prioritize projects for the development of the website.

My background spanned across the stakeholder groups, being a student at Cornell University and an Extension Agent at the University of Florida. Both Cornell and the University of Florida are Land Grant Universities, and I have worked to support the MarketMaker site at both institutions. My background for ten years was in information technology, with a focus on website development and management. Finally, I earned a master's degree in agronomy, worked on several vegetable farms, and purchased and sold wholesale and retail produce. My background increased the potential for me to bridge the gaps with stakeholders and facilitate a process to consensus.

The Research Methodology

Just as diverse as the MarketMaker stakeholder groups were the perspectives and possible decision-making approaches, including business analysis, project management, and various academic research disciplines. Some of these approaches, along with their similarities and differences, are discussed in Chapter 2. The concept

mapping methodology developed by William Trochim (Trochim, 1989a) was used for this research. A web-based application, CS Global MAX (CSGM), was used to facilitate the data collection and analysis (Concept Systems Incorporated, 2005).

Concept mapping can be used to help a group of individuals express their ideas on a topic, aggregate and analyze the ideas as quantitative data, and visualize the results. It has many characteristics that were particularly beneficial to this project.

It provided a structured communication process between diverse stakeholders, and between the stakeholders as a group and the technology team. It is a low-cost and convenient technology that allows people to participate in person, asynchronously online, or both. As a research-based mixed-methodology, it emphasizes the use of data and statistical analysis in a transparent and credible process. Finally, it identifies a comprehensive set of options from which the stakeholders and can make decisions. These characteristics as they relate to other methodologies are discussed in more depth in the next chapter.

The methodology was proposed to several MarketMaker groups, including the evaluation committee, the national partners, the Policy Advisory Committee (the organization's governing body), the parent company of Riverside Research, and the University of Florida. Some of the stakeholders were already familiar with the process

through their participation in an earlier project to develop a MarketMaker mobile application (Cho & Tobias, 2010). All of the groups were supportive, relieved to have a method to resolve the challenges facing MarketMaker, and anxious to move forward. It was agreed that the study would be conducted as part of the evaluation committee, on which I was invited to sit.

The Research Question

The project committee discussed the diverse needs for the research and agreed that the primary objective was to gather stakeholder perspectives regarding MarketMaker problems and opportunities so that consensus-based decisions could be made about the continuing design and development of the website and program. The committee settled on a single research question to address this, posed as a focus prompt: "One specific thing that would make MarketMaker valuable to me or my audiences is …" The process for selecting the research question as well as expectations are discussed in Chapter 3.

The background of the MarketMaker website was described in this chapter, along with its purpose and challenges. The major elements of the research, including the research population, methodology, and question were also discussed. This introduction provides the background on these elements to better understand the general class of underlying factors, including the design of technology solutions,

stakeholders and decision-making approaches, and data-driven decision-making methodologies. These are each explored in more depth in the Literature Review, Chapter 2.

CHAPTER 2: Literature Review

Introduction

This chapter discusses and reviews the literature for this research, including the three topics addressed in Chapter 1: the research topic, the research population, and the research methodology. Whereas Chapter 1 was specific to the MarketMaker website, this chapter considers the three topics in a more general sense as they relate to the broader class of topics. The three topics addressed in this chapter are: design of technology solutions, stakeholders and decision-making approaches, and decision-making methodologies. Various examples of each, including underlying theories are explored. This chapter culminates with an overview of the concept mapping methodology used in this research, as an introduction to Chapter 3.

Design of Technology Solutions

The background of the MarketMaker website and the issues that needed to be resolved were discussed in Chapter 1. While the context, purpose, and challenges may be specific to MarketMaker, designing technology solutions in general involves some of the same aspects and challenges. Technology decisions are increasingly difficult not only as technologies advance, but also as stakeholder groups become larger, and as organizations evolve (Toman, Adamson, & Gomez, 2017).

Technology decisions are also becoming more common as technology reaches farther into organizations. Whether the decisions concern website development, cloud strategy, or digital transformation, they are complex and involve more specialized needs and areas of expertise. Educause, an organization that works to advance higher education through the use of information technology, states that information technology is increasingly used to improve operational efficiency and yet the complexity and rate of change of technology is increasing (Grajek & Grama, 2018).

Stakeholders and Decision-Making Approaches

Stakeholder Theory

Although the concept mapping methodology does not require that the sample population be representative of the stakeholder group (Kane & Trochim, 2007), the research population was considered to be largely representative of the MarketMaker stakeholders. Participants included stakeholders internal to the MarketMaker program, partners, and end users of the website. Since anyone who sells or buys food could use the website, however, a potential MarketMaker stakeholder could be virtually anyone. All participants were assumed to have the same level of authority in the generation of feedback.

Stakeholder Theory addresses the management and morals of an organization by identifying “who or what really counts”. Freeman defines a stakeholder as "any group

or individual who can affect or is affected by the achievement of the organization's objectives" (1984). The theory has been commonly applied to large corporations, but that limitation is not inherent in the theory (Friedman & Miles, 2002; Phillips, Freeman, & Wicks, 2003).

The application of the theory since it was introduced in 1984 has resulted in many definitions of what and who a stakeholder is (Donaldson & Preston, 1995; Miles, 2012; Mitchell, Agle, & Wood, 1997). Phillips, et al. explain that the stakeholder term can mean different things to different people, given the term's large conceptual breadth (Phillips et al., 2003).

Phillips makes a broad distinction among stakeholders, however, between normative and derivative stakeholders. It is the for the benefit of the normative stakeholders that the organization is managed. The organization is not managed for the benefit of the derivative stakeholders, but they are able to either benefit or harm the organization (Phillips, 2003).

This definition and distinction is useful in terms of MarketMaker stakeholders. The primary participants in the study were normative stakeholders, including researchers, administrators with responsibility for state funding to support MarketMaker, educators, etc. Normative stakeholders also include end users of the website,

including farmers and wholesalers.

MarketMaker's derivative stakeholders primarily include competitors. There are few direct website competitors, but the most significant competitors may be less visible. They include other researchers or stakeholders who are not affiliated with MarketMaker or its end users. They may be University faculty or administrators who would like to see other uses for the resources consumed by MarketMaker, including funding, staff, and administrative support.

One of the primary issues of stakeholder theory is the priority or authority held by any individual or group of stakeholders over another. Stakeholder theory has varying opinions about who has more consideration in decision-making. Many state that all stakeholders should benefit equally (Jones & Wicks, 1999), in proportion to their contribution (Phillips et al., 2003), or depending on their legitimacy (Friedman & Miles, 2002).

As described in Chapter 1, the MarketMaker stakeholder group is diverse and includes several distinct subgroups based on industry as well as several other criteria outlined in the Results chapter. The project had vested stakeholders who had contributed significant funds and resources and they were unified by a common interest in the development of MarketMaker for their own needs.

Decision-Making Approaches

Each stakeholder group might approach the decision-making process differently depending on their background or needs. A broad survey of potential approaches across the public and private sectors is explored below, with different aspects of the approach being more relevant for the MarketMaker challenges. They span from public to private sectors and from food-related economic development to the technology solution purchased. The areas explored here extend beyond the MarketMaker stakeholder group in order to learn from other disciplines. Some approaches entail a formal methodology that may or may not lend itself easily to other types of situations. Regardless, there are often similarities and common components between them.

In this chapter, the concept of a methodology is composed of defined steps, which can be replicated in different settings by different facilitators, with the emphasis on the participants rather than the facilitator. The approaches discussed here do not necessarily use a methodology. In fact, one of the things this section reveals is the scarcity of these methodologies. These approaches are also not necessarily decision-making approaches, but a process of gathering stakeholder input to better understand an issue, to create alignment and consensus, so that decisions can be made.

Federal Government and the United States Department of Agriculture

Development of the local food system was the starting point for the MarketMaker website. It is intended as a tool to enable economic development related to local food systems, through research and connecting buyers and sellers. The website is devoted to economic development as it relates to local food systems, but stakeholders struggled to agree on the website's most valuable aspect partly because there was little consensus about priorities in food systems themselves.

There is a widespread and growing interest in local food systems, but progress toward developing local food systems has been slow because there are so many facets to understand and pursue (Martinez, 2010). Some have turned their attention to standardizing the approaches to measure and evaluate the economic development potential in a given economy and other benefits associated with local foods.

As O'Hara and Pirog note, "The recent growth in local food markets has resulted in various local food economic impact assessments. However, drawing overarching conclusions from these studies is difficult. Data collection is challenging, and the handful of studies with transparent and well-defined methodologies have generally used data and modeling techniques with narrow geographic and market scope" (O'Hara & Pirog, 2013). This lack of standardization has been such a challenge that the United States Department of Agriculture's Agricultural Marketing Service funded

a project to pull together best practices into a toolkit that communities can use to gather feedback and data to evaluate their local food systems.

While the emphasis of the toolkit is on assessing the economics of local food systems, it also recognized the importance and difficulty of stakeholder input. It states that "projects should always begin with a broad discussion of the fundamental questions and priorities that community stakeholders would like to see addressed as a result of the assessment process" (Thilmany McFadden et al., 2016). It falls short of recommending a specific methodology, however, and instead offers general suggestions to facilitate discussions about underlying local economic data.

The website was ultimately intended to assist farmers, distributers, restaurateurs, related businesses, and individuals. These stakeholders were often not represented in MarketMaker discussions or decision processes, however. Even among this limited group of stakeholders, it would be a challenge to come to consensus about priorities or approaches to reach the potential of a local food economy. Whether the greatest value was market research or the ability to make a connection that ends in a sale, required research, education, and facilitation to develop the site and for end users to understand why and how use it.

Local Government and Public Planning

A very active area of development in formal stakeholder feedback processes can be seen in public planning in local governments, including the development of local food systems (Hodgson, 2012). McFadden points out that "Economic development officials, local policymakers, and community planners are increasingly interested in examining the many benefits offered by local and regional food systems" (Thilmany McFadden et al., 2016).

The American Planning Association conducted an extensive review regarding food related goals and policies in local governments across the United States. Of the 888 responses that the study included, 69 explicitly addressed food system topics in their Comprehensive Plan. Of those, 33 percent did not use an assessment tool to identify food system-related problems in the community, and another 15 percent were unsure (Hodgson, 2012).

While this study is now five years old and the response today would likely be significantly higher, it is interesting that a public-sector field that is otherwise advanced in terms of gathering and processing stakeholder input has not applied those same tools and expertise towards food system development. Hodgson summarizes this when she states "… food systems planning remains an emerging area of planning practice" (2012).

While planners were not represented among the MarketMaker stakeholders, they are a common partner with Extension and higher education. Not only has the public planning field developed the role and capacity for soliciting public feedback, but they have developed a rich set of tools for civic engagement. Hundreds of platforms have been developed by businesses to support public efforts, from startups to Microsoft (Patel, Sotsky, Gourley, & Houghton, 2013; Simpson, Sifry, & Stempeck, 2016).

The primary audiences for these tools are typically residents interested in developing a stronger community, with the point of reference being a physical neighborhood or other physical location (D. Parham, Unpublished Market Survey for Rockefeller Foundation 2016). Of the many public planning platforms that exist, collecting and prioritizing stakeholder feedback are very common components. Such a platform could conceivably be applied to other topics, however, including the development of food system or technology solutions like the MarketMaker website.

Higher Education

The MarketMaker website was built on a foundation of research and education. The project originated at a Land Grant Institution, the University of Illinois, and the partnership of each state is based in a Land Grant University. Most of the stakeholders working on MarketMaker were based in academic institutions, and the public sector more broadly. The education and outreach for MarketMaker are often

accomplished through Cooperative Extension.

The project to facilitate the development of the MarketMaker website, however, was not a natural fit for Extension. Extension is more often in an education role than a research role and facilitating technology development is not a typical area for it. Like the USDA toolkit, Extension does not employ a standard methodology to process stakeholder feedback. Furthermore, participants were spread across the country, so while MarketMaker offered benefits to local economies, the scope of this project extended beyond what would normally be led by a local office.

Extension was a good fit in several other ways, however. The mission of Extension is to provide research-based information that addresses the needs of the community. Staff and faculty routinely solicit and act on input from local partners to determine research and education agendas (Peters, 2006). Addressing issues that require stakeholder consensus in order to affect change are often the starting point for this work. A needs assessment is communicated to new faculty and staff as a fundamental Extension tool to develop a program, but often only as a general approach and not as specific methodologies.

A national project called Extension Reconsidered has cast a new light on the historical and perhaps future role of Extension (Peters, 2006; Peters, 2014). "The initiative was

ultimately interested in exploring questions about how Extension can help citizens address the critical economic, ecological, and social problems that we face in the 21st century" (Jensen, J. and S. Peters. Unpublished Report to the Kettering Foundation: Extension Reconsidered. 2014). The initiative encourages what they term "deliberative forums" to gather feedback, led by Cooperative Extension among its thirteen member-states. Still, the forums did not employ a formal process, but were qualitative discussions led by a facilitator (Spranger & Acord, 2015).

Many of the MarketMaker stakeholders did have research backgrounds though, using formal methodologies and quantitative measurements. A report by Educause identifies a data-enabled institutional culture, meaning using "… analytics to inform the broad conversation and answer big questions" as one of the top ten information technology issues in higher education (Grajek & Grama, 2018).

They also identified data-driven decision-making as one of the top trends exerting the most influence on higher education's information technology strategy. They state that "Data-driven decision-making aims to derive meaning from data and determine the best actions to take. This approach to decisions can be incorporated into existing planning and management activities and processes …" (2018).

The topic of data-driven decision-making in education has been dominated by

learning analytics and student success since being included as one of the four pillars in the American Recovery and Reinvestment Act of 2009, but federal education officials encourage the use of data in policy and practice more broadly. Writing on the cultural expectations within the education sector, Mandinach writes that "It is no longer acceptable to simply use anecdotes, gut feelings, or opinions as the basis for decisions" (2012).

Data-driven decision-making was adopted in higher education from private industry and manufacturing, including the frameworks of Total Quality Management, Organizational Learning, and Continuous Improvement (Ikemoto Gina & Marsh Julie, 2007; Marsh, Pane, & Hamilton, 2006). It has been used for decades in the private sector and is correlated with higher performance (Brynjolfsson & McElheran, 2016b; McAfee, Brynjolfsson, Davenport, Patil, & Barton, 2012), but has been receiving renewed attention over the past several years in both private and public sectors (Brynjolfsson & McElheran, 2016b; Grajek & Grama, 2018; Marsh, Pane, & Hamilton, 2016).

Business Analysis

The hosting, managing, developing, and troubleshooting of the MarketMaker website were under the purview of a Riverside Research technology team. This team was also in the default role of receiving, evaluating, and implementing stakeholder feedback

that was offered. That could mean developing refinements and fixes for existing features or developing new ones. Up until this point, they had operated as an internal technology team that was inward facing. They did not have the experience or culture of processing external input.

The technology team had been fixing problems and making improvements for several months when discussions began turning to the creation of a project pipeline based on stakeholder input. From a technology perspective, work had been proceeding and progress was being made on urgent and identified priorities, so it was unclear why a new and unfamiliar process was necessary or desirable. From an external perspective, the work was being executed selectively through a lens of information technology and website development. It was not aligned with a consensus about priorities because no consensus had been established.

The technology team's website development operations were based on the formal processes of business analysis and project management, traditional approaches in the private sector and especially in technology. The International Institute of Business Analysis states that "Business Analysis is the practice of enabling change in an organizational context, by defining needs and recommending solutions that deliver value to stakeholders (2015)."

It is a structured framework that covers 6 knowledge areas: Business Analysis Planning and Monitoring; Elicitation and Collaboration; Requirements Life Cycle Management; Strategy Analysis; Requirements Analysis and Design Definition; and Solution Evaluation. Solicitation of input from stakeholders is an integral aspect throughout the framework (International Institute of Business Analysis, 2015).

The process does not prescribe a methodology by which to gather the requirements, however. The technology team was receiving input from a variety of sources, including the partner group and individual stakeholders, and direction from Riverside Research and the MarketMaker Policy Advisory Council. Perhaps they saw this as sufficient in terms of requirements identification. That appears to be a sentiment shared among some technologists, as expressed by Jiao in a review of engineering research issues when he states that "customer requirement management involves a tedious iterative process …" (2006).

The team then used a formal project management process and change control to document any changes made. Information technology increasingly utilizes faster and more adaptable approaches for software development, integrating requirements gathering and solutions development. "Agile" has become a dominant set of twelve principles which guide an ongoing process of feedback and development that evolves continuously (Fowler & Highsmith, 2001; Larman, 2004).

The technology team had adopted these principles and used repeated iterative "sprints" or short cycles of feedback and implementation (Project Management Institute, 2013). These processes can be very effective with a defined group of project sponsors and software developers, or for a larger group to refine or continue an established project. The MarketMaker stakeholders, however, did not have a common baseline or consensus about the status of the project and the path forward. While the agile approach could work well later in a development process, it did not have the capacity to get a consensus-based identification of requirements to the technology team.

Design

There are private sector processes that are growing in usage for situations in earlier development such as these. This is especially true in design-related fields where successful product development requires input from stakeholders in a more extensive process than surveys or focus groups. Generic and inclusive terms for this type of process are user-centered or human-centered design, and a prominent process that has gained traction is called design thinking.

The concept of design thinking dates back to 1965 as a process of creating physical designs (Archer, 1965), but it has more recently been applied to organizational

strategy to integrate user input and development. A firm called IDEO and its founder Tim Brown brought this process into mainstream use (2008, 2009). He explains the application of design for this type of setting as follows: "Throughout most of history, design was a process applied to physical objects … But as it became clear that smart, effective design was behind the success of many commercial goods, companies began employing it in more and more contexts … Today design is even applied to helping multiple stakeholders and organizations work better as a system. (Brown & Martin, 2015)"

Design thinking places emphasis on three areas, according the Brown (2008, 2009), although the number can vary. The first and perhaps most important area is an understanding of and ability to empathize with the stakeholders, so that the problem can be defined and framed (Morris & Warman, 2015). "In the design-oriented approach popularized by IDEO, the work to understand users was deeper and more ethnographic than quantitative and statistical (Brown & Martin, 2015)."

The second area of the design thinking process is prototyping, which begins with ideation and then an early prototype development that is presented to the stakeholders for feedback in a repetitive cycle of development and feedback until the final product is produced. The presentation to stakeholders may take place with a storyboard, which is "a series of scenes that take the potential user through the

solution step-by-step. (Morris & Warman, 2015)"

Moving from empathy to ideation, and then to prototyping requires the designer to facilitate the process and gather the essential information. As Warman states, "Design thinkers strive to balance what is desirable from a user's point of view with what is feasible with technology and viable from a business factors perspective. (2015)" The third phase is a tolerance for failure. Design thinking encourages failure to be seen as part of a learning process so that the next process can improve upon it. This includes regular testing at the end of each prototype cycle, to find areas to improve (Kolko, 2015; Morris & Warman, 2015).

Kolko states that design "helps people and organizations cut through complexity. It's great for innovation. It works extremely well for imagining the future. But it's not the right set of tools for optimizing, streamlining, or otherwise operating a stable business. (2015)" Design thinking is a flexible and intriguing process that lends itself well to creating a common understanding of the needs of a group or organization.

Website Design

Private businesses have arisen that offer tools for website development that are remarkably similar to the concept mapping methodology. A popular example is Optimal Workshop (Optimal Workshop, 2018). They describe themselves on their

website as "A User Research Platform that helps you and your team make design decisions with confidence. We've created a suite of usability tools that help improve your website navigation, define information architecture, understand first-clicks, capture qualitative research, and more". These tools include the identification of stakeholders, elicitation of ideas, refining the ideas, sorting and rating, and visualization that represents the ideas and their relationship to each other.

Technology Sales

Gathering and focusing stakeholder feedback to make decisions about solutions is highlighted in the technology sales area. Salespeople typically work with situations and stakeholder groups not unlike MarketMaker. In fact, MarketMaker interacts with salespeople who want to integrate a new service to the website. The decades-old sales process has changed since the recession, however, so that working with stakeholder groups has become critical to success (Schmidt, Adamson, & Bird, 2015).

As technology becomes more complex and more integrated into the organization, it affects more people and more people become stakeholders. The number of people involved in the buying decision process has increased from 5.4 people in 2015 to 6.8 people in 2017. This also creates a larger and more divergent set of priorities, making it more difficult for stakeholder groups to make a decision (Toman et al., 2017).

Schmidt et al. describe the challenges of working with groups of individuals with different roles and authority. Creating consensus starts with creating a shared language and perspective around a problem and solution. They state, "The best way to build customer consensus isn't to do a better job of connecting individual customer stakeholders to the supplier but to more effectively connect customer stakeholders to one another" (2015).

All of these organizations and disciplines have traditions, recommendations, and tools to gather and process stakeholder input in order to make decisions. Formal methodologies, especially data-driven, are relatively rare. To the extent that they do exist, they often rely on the facilitator to interpret the stakeholder feedback and produce and propose the final product.

Decision-Making Methodologies

Methodologies have important advantages in the decision-making process. The same or effectively similar results are virtually impossible to arrive at without such a process, since unstructured conversations would require more time and facilitation expertise than are typically available. A methodology can provide critical structure and accountability while uncovering the knowledge and ideas among the participants.

An important characteristic of a methodology is the extent to which it relies on the

training and skill of the facilitator. A great facilitator can use an intuitive and manual process, but that process is less likely to work in every situation and it is not easily replicated. Leaving the interpretation and representation up to the facilitator can also make it difficult to prevent subjectivity and bias from affecting the outcomes (Jackson & Trochim, 2002). A methodology can allow the facilitator to step back from the center stage and focus on standardized steps of a process, allowing the participants to be more centrally involved.

Dean and Sharfman state that there are two reasons why a process matters; that different processes result in different choices, and that different choices result in different outcomes that are not equal. Furthermore, they state "Managers who collected information and used analytical techniques made decisions that were more effective than those who did not" (Dean & Sharfman, 1996).

It also apparent that data-driven decision-making has a positive impact. McAfee, et al. found that companies that were self-described as data-driven had better objective measures of performance (2012). Likewise, Brynjolfsson finds that an increasing number of firms are using data-based analytics rather than a leader's "gut instinct" and that they perform better in a variety of industries (Brynjolfsson, Hitt, & Kim, 2011; Brynjolfsson & McElheran, 2016a, 2016b).

Concept Mapping

The methodology used in this research is concept mapping, as developed by William Trochim. Concept mapping is a structured conceptualization technique to gather, analyze, and visualize the ideas of stakeholders (Trochim, 1985, 1989b; Trochim & Linton, 1986). A concept map is a diagram that illustrates the relationships between ideas and concepts, and the process of creating it can be used as a method of gathering and processing stakeholder feedback. Trochim's process has been used for a variety of topics (Anderson et al., 2006; Trochim, Cabrera, Milstein, Gallagher, & Leischow, 2006; Trochim & Kane, 2005; Trochim, Cook, & Setze, 1994).

As a Decision-Making Methodology

Concept mapping is not a decision-making methodology per se, but it has been used extensively for consensus building (Trochim & Linton, 1986). It is also consistent with the tenants of decision-making theory, in that the concept mapping methodology allows the development of a range of acceptable ideas that evolve and become refined in the brainstorming phase before participants eventually evaluate them (Hirokawa, 1982, 1985, 1988; Hirokawa & Johnston, 1989; Orlitzky & Hirokawa, 2001).

Concept mapping also fulfills more comprehensive theories of decision-making, in that it begins with an analysis of the problem and development of a goal, as is accomplished in the development of the concept mapping focus prompt. Concept

mapping does not evaluate the positive and negative characteristics of each statement, however, as stipulated in Gouran & Hirokawa's expanded theory (1996).

Online or In Person

The methodology offered many benefits to the MarketMaker stakeholders. It provided a framework for a structured communication process between diverse stakeholders, and between the stakeholders as a group and the technology team. It is a low-cost and convenient technology that allows people to participate in person, asynchronously online, or both. One of the most challenging aspects of the MarketMaker research was that the stakeholders gathered only annually for an in-person meeting. The process needed to take advantage of potential participants being present at the annual meeting, but also enable remote participation.

In-person processes have the advantages of human interaction, potentially eliciting more feedback, whereas online platforms offer convenience that can be critical to increasing participation. Because of the relatively limited time investment required of participants, concept mapping is more likely to keep them engaged for the duration of the project. To the extent that this is the case, the participant group that completes the process is more likely to be representative of the initial group.

Online platforms can also increase the level of honesty by allowing people to provide

feedback privately or anonymously. Finally, online participation may facilitate data collection and analysis since data is entered in an electronic format.

Methodology Phases

The six phases of concept mapping, as described by Kane and Trochim (Kane & Trochim, 2007), are discussed below. They include preparation, idea generation, structuring, analysis and visualization, interpretation, and utilization. The specific methodology used in this research is discussed in Chapters 3 and 4.

Preparation and Idea Generation

The first concept mapping phase is project preparation and includes identification of the project team and participants, planning, and configuration of the CSGM platform. These are internal tasks in preparation for the first public phase, the generation of ideas. The most basic and most common component of related methodologies is collecting feedback in the form of a listening session, focus group, survey, brainstorming session, or requirements elicitation (Jiao & Chen, 2006).

According to the first person who suggested brainstorming as a method for group problem solving, the primary advantages of brainstorming are that it increases the quantity and quality of ideas generated when compared to individual contributions (Osborn, 1953). These are important attributes because the set of ideas that a project

is based on should be of sufficient quantity and quality that it comprehensively represents the perspectives among the stakeholder group. As the Nobel Laureate Linus Pauling stated, "The best way to have a good idea is to have lots of ideas."

This is not without debate, however. Diehl and Stroebe point out that the quantity advantage has been disproven and the quality is difficult to measure. They conclude that the two most significant reasons for this are "production blocking", in which production of ideas is limited because only one person can speak at a time and because of "evaluation apprehension", in which a stakeholder may not be forthcoming with their ideas for a variety of reasons (Diehl & Stroebe, 1987).

These issues point to the importance of group dynamics in the methodology. A formal stakeholder process can have an important equalizing effect, presenting each idea to the community with equal weight. Validating stakeholder input is important to building trust in the results, while avoiding pitfalls of bias, unequal representation, or intimidation.

It was recognized that the stakeholders were very diverse in terms of geographic and demographic needs. They came from coastal, urban, and rural geographies, affecting the types of economies and communities with which they were concerned. Some worked on food systems that were primarily defined by production agriculture and

others that were driven by consumption. The participants also had various roles, including educators, researchers, decision makers, technology developers, farmers, business owners, etc.

Perspectives among the stakeholders were known to be varied even within those groups. Conversations about changes and improvements to MarketMaker focused on features and improvements to the website, but some others were focused on more fundamental issues, including the purpose and value of the site, governance, and the business model.

An individual's trust in the other members of a group is critical to the achievement of consensus, and Edmondson states that the key factor in that trust is psychological safety (1999). Stakeholders who feel safe and confident enough to express themselves can enrich a stakeholder process by providing minority views that may otherwise be missed (Nemeth, 1986; Nemeth, 1995).

Without a formal process, the dynamics of a group can overpower those of the individuals that make up the group. This can lead to groupthink, in which people suppress their own viewpoints in favor of group harmony, with the classic example being the Bay of Pigs invasion (Janis, 1972). The Abilene Paradox is another example of where group dynamics can overpower the individual. In it, a group makes a

decision that is contrary to the interest of most or many of its individuals because they believe their own opinion is the exception (Harvey, 1974, 1988).

The format of the concept mapping methodology minimizes these risks because people can participate anonymously online. Each stakeholder holds valuable but incomplete knowledge about the problem and potential solution. Allowing them to contribute their knowledge and perspective makes it more likely to identify a comprehensive set of ideas that fully represent the issue being studied. These may include new ideas or improvements on existing ideas.

Structuring and Analysis

The ideas are then synthesized and reduced to a manageable size as a final statement set in preparation for the third concept mapping phase, structuring. Beyond the basic needs of any stakeholder group, such as equality and accountability, the MarketMaker group included stakeholders from higher education who were very familiar with research methodologies and were less likely to trust a process at face value.

As a research-based mixed-methodology, concept mapping emphasizes the use of data and statistical analysis in a transparent and credible process. Each phase of the concept mapping process is defined in a reproducible way that minimizes the potential bias of the facilitator. The qualitative data from idea generation and its

conversion into quantitative data in the structuring phase defines concept mapping as a mixed-methodology.

Qualitative methods are useful for eliciting viewpoints, ideas, and opinions from stakeholders. Quantitative methods have the advantage of impartially revealing relationships between ideas and perspectives. Mixing the two leverages both strengths, in what Greene, et al. refer to as a "development" type of mixed-method (1989).

In the structuring phase, participants sort each of the final statements into groups that they think are meaningful. This information is then converted to quantitative data and analyzed with multi-dimensional scaling and hierarchical cluster analysis, discussed in the next chapter. A secondary structuring step is the prioritization of the statements, rating them with multiple metrics.

This structured and defined methodology with a deep literature base made the use of concept mapping a more compelling case for those stakeholders who might have been skeptical or critical.

Interpretation and Utilization

The resulting maps identify a comprehensive set of options that the stakeholders can discuss and from which they can make decisions. The maps show the range of ideas

that exist and how the individual ideas relate to each other.

The implementation of the results may not be part of a stakeholder process but integrating the end of the process with an existing implementation or project management process can be critical to the success of the project. In the absence of an existing process, an implementation plan devised before the conclusion of the project ensures not only implementation but also that stakeholders do not lose trust in the process due to a lack of implementation.

This section on decision-making methodologies addresses the reasons for using a methodology and how concept mapping addresses those issues. The concept mapping process as it relates specifically to the MarketMaker research is discussed in more detail in the next chapter.

Conclusion

This chapter addressed the three topics described in the introduction as they apply to a more general class of topics. Chapter 1 addressed the research topic, population, and methodology, whereas this chapter broadened the topic to the design of technology solutions, stakeholders and decision-making approaches, and decision-making methodologies. The ubiquity and complexity of technology decisions were discussed, followed by examples and a consideration of the theoretical underpinnings of

stakeholder groups and decision-making methodologies.

The discussion of methodologies leads into the next chapter on the specific methods for this research. There are many approaches and tools to choose from in addition to the ones covered in this chapter. Some of the non-research approaches described above use tools such as Q-Sort with a rich research foundation. Concept mapping, however, offered a comprehensive package that worked well for this situation. It has a well-developed research and literature foundation, with several meta analyses, and is recognized as an effective and reliable methodology (Donnelly, 2016; Rosas & Kane, 2012; Trochim, 1993).

CHAPTER 3: Methodology

Introduction

The Concept Mapping process is composed of six distinct phases, including preparation, generation of ideas, structuring the ideas, analysis of the ideas, interpretation, and then utilization of the ideas (Kane & Trochim, 2007). This chapter discusses the four initial stages of the MarketMaker project, through the preparation of the project and the data generation, processing, and analysis. The final two stages of interpretation and utilization are discussed in the results chapter.

Preparation of Project

The first phase is project preparation, which includes determining the project goal and the research question, identifying the stakeholders and participants, the specific process and configuration, the schedule, and reporting. Preparation may also include a pilot test of the research, to ensure that assumptions and expectations are valid and complete. The majority of the MarketMaker project was spent on the preparation phase.

Project Committee

The first task was to form a committee to guide and advise the project. I strove to have a committee representative of the expected research participants. I also needed

people who had stature within the MarketMaker project as well as within their institutions, to encourage participation and to help gain the access that we might need to push the project forward. At the same time, I recognized that this group of people would likely be busy and difficult to schedule, so I wanted to keep the size of the committee small enough to manage. After consulting with the MarketMaker founder, I individually selected five members, shown in Table1 below.

Table 1: Project Committee Members

Name	Title	Relation to MarketMaker
Dr. Khin Mar Cho	Senior Research Associate, Cornell University	Extensive experience managing the MarketMaker program in New York State, and previous concept mapping experience on multiple projects
Daniel Hayes	Program Manager, Riverside Research	Oversaw MarketMaker technology development during the project
Dar Knipe	Co-founder of MarketMaker and Subject Matter Expert	Comprehensive perspective of MarketMaker
Dr. David Lamie	Associate Professor, Clemson University	Chair of the MarketMaker Research and Evaluation Committee
Dr. Allen Wysocki	Associate Dean and Professor, University of Florida	Brought MarketMaker to Florida

Specific discussions with the committee focused on who would be included as

participants and what variables about the participants were important to know, as well as how we would communicate with them about the purpose, phases, and results of the process. We also discussed how we would undertake the logistics of the project, including the research question, schedule, registration, and conducting a pilot.

Participants

The research population for this study included all MarketMaker stakeholders, so it was quickly agreed that the widest user base would be most valuable. In some cases, the participants were themselves the full research population, and in other cases, we sought a representative sample of the comprehensive group of MarketMaker stakeholders. We needed to include Riverside Research, the parent company, and the technology team in particular. We certainly wanted to include representatives of the partner states who were typically the decision makers about the continued participation of their institution, as well as researchers and educators from the same institutions.

As discussed in previous chapters, stakeholders crossed public and private sectors. It was fortunate that most of the stakeholders were well represented among the various recurring meetings organized by the MarketMaker leadership. The group of MarketMaker partners met monthly via conference call with a good representation of higher education and Extension, Riverside Research and the technology team. These

groups were reached via conference call presentations and follow up email communication.

One stakeholder group that was not represented on the committee were external users of the site, comprising the third group of primarily businesses and customers. They were also reached via emails and notices. Riverside Research forwarded an email invitation to all registered users of the website. We were able to post notification of the study on the national website as well. We were therefore confident that all stakeholders were invited to participate and that we should have a largely representative sample of the population.

Demographic Variables for Study

The initial invitation sent to participants included a link to the project website, where they would be asked to answer a short set of non-identifying, self-descriptive questions. These variables would be linked to the sorting and rating phases described below, but participants could create a profile and answer the demographic questions at any point.

The committee had much discussion around what demographic variables were important to ask and record. There was some difficulty in agreeing on what would turn out to be the most valuable variables. There are many smaller sub-groups that

would have been difficult to represent as separate groups. Some examples included farmers, producers, wholesalers, distributers, retailers, consumers.

There were several other groups that were distinct but small, with particular interests such as Farm to School, labor markets, international markets, seafood, agritourism, etc. While we wanted their participation in the study, we also recognized that the primary purpose of the research was to get the partners to arrive at consensus about how to identify and prioritize needs that affected the site and stakeholder group as a whole.

We settled on the following six questions and possible answers as drop down menus in Table 2 below.

Table 2. Demographic Questions

Questions	**Possible Answers**
1) What institution are you affiliated with?	-MarketMaker partner organization, Land Grant University, Riverside Research -For-profit business (producer, processor, wholesaler, distributer, retailer) -NGO, government -Other
2) What state do you primarily work in?	-Alabama through Wyoming (each US State listed separately) -Multiple states (for those working in more than one state)
3) Is the region you focus on rural? (The next 2 questions ask	-Yes -Somewhat -No

about urban and coastal)	
4) Is the region you focus on urban?	-Yes -Somewhat -No
5) Is the region you focus on coastal?	-Yes -Somewhat -No
6) What is your role?	-State PI -Researcher -PAC -Outreach/Educator/Facilitator -Tech team

Institutional affiliation and location were fundamental to the way stakeholders saw each other, so they were each assigned one question. Location was split into both state and type of geography, recognizing that a rural part of a state may have more in common with a rural part of a distant state than it does with an urban area of a neighboring state. Since many food system production and consumption issues are associated with different types of geographies, it was important to associate the feedback as urban-rural-coastal.

It was also anticipated that specialized MarketMaker sites might be customized and targeted, so it could be important to know what was prioritized by participants from different location types. The priorities of a coastal subgroup, for example, could help inform the development of a seafood portal. A rural state considering joining

MarketMaker might want to know the perspectives of current rural stakeholders.

It was expected that people might identify with more than one description, and the software did not allow multiple answers to the same question. That meant that options were to ask it once with many possible answers to choose from or to ask it three separate ways, which is what we chose to do. A county Extension educator might have a focused perspective whereas a dean from the same university with a statewide perspective might select all three.

The participant's role was also an important factor because the way that the MarketMaker project developed from an individual's perspective depended on their role. A decision maker, researcher, educator, or web developer would likely have very different opinions about specific ideas for development.

Project Format

One of the features of the Concept Mapping process is that it can be executed either online, in person, or both. In order to include as many participants as possible, it was decided to offer both an online option and a paper option for people to participate, taking advantage of an upcoming in-person meeting and recognizing that the stakeholder group was geographically dispersed and would only be partially represented at the in-person meeting. Paper responses were then entered manually

and combined with the online data.

As noted in Chapter 1, the CSGM application was used to facilitate the concept mapping process. Data could be entered directly by participants, but also by the researcher in the event that participants submitted their responses on paper.

Registration

The CSGM software allows several registration types, including pre-registration, anonymous registration, and self-registration. Pre-registration seemed cumbersome and limiting because accounts would need to be pre-populated, meaning that we would need to know who the participants would be ahead of time. It also raised privacy considerations that were easily avoided with a different registration option. Anonymous registration would work for the generation of ideas, but the rating would need to be associated with demographic variables.

It was therefore decided to use self-registration, meaning that participants register with an account but could remain anonymous. We encouraged people to register with an email address to enable follow-up communication. For instance, the software allows a mass email to be sent to participants who had not finished a particular phase or individuals who might have forgotten their password.

The Focus Prompt

Perhaps the most important component of the project preparation was determining what question the participants would be asked, or the focus prompt. The focus prompt is the most fundamental research question for the project. After several discussions around this question, we agreed that it should ask people to complete a sentence (i.e. I think that …"), rather than a standard question (i.e. "what do you think?"). The thinking was that an incomplete prompt might be more effective at getting people to generate ideas and keep the responses in a standard syntactic form. Responses with the same form of a completed sentence would be easier to read and compare later in the study.

A primary issue was whether the question should focus on development of the MarketMaker website or whether it should be more encompassing of the MarketMaker program. Since most of the discussion around MarketMaker focused on the website, including needed revisions and features, limiting the prompt to such questions would provide valuable and focused feedback. Implementing the feedback would fall primarily to a technology development team, so the final Utilization phase would be relatively straight forward.

Opening the feedback to a broader question might make it more difficult to arrive at consensus around the many aspects that could be raised from a broader question. It

might also invite feedback about things that were politically sensitive, where participants have limited information or understanding, or that might be under the purview of decision makers who might not be willing to relinquish control. Inviting feedback about such topics could create new expectations among participants and would require a willingness on the part of the MarketMaker leadership to receive and act on it. Unlike feedback limited to the website, it could be unclear who might be tasked with making more complicated decisions that entailed multiple components.

Many variations of focus prompts were considered, and four that cover a spectrum from broad to specific are below.

1) MarketMaker would be most helpful to me or my audiences if it were to …

2) One specific thing that would make MarketMaker valuable to me or my audiences is …

3) A valuable aspect or feature of the MarketMaker website to end users would be …

4) A valuable aspect or feature of the MarketMaker website to potential new users would be …

Recognizing that there were advantages and disadvantages to each, we ultimately chose the second option, "One specific thing that would make MarketMaker valuable

to me or my audiences is …" The second option was open to all feedback, not just to the website, but requested that responses be specific. In case the intentions of the focus prompt might not be clear to participants, some examples would be provided by the committee to "seed" or illustrate the breadth of responses that could be submitted.

One weakness is that the conditional tense might make it unclear whether responses should address existing "things", or only things not yet existing. During revisions based on the feedback, this could potentially result in an existing feature being removed because it was not addressed in the feedback and thought not to be valued. This was considered an acceptable risk by the committee. This would also leave open the possibility that a participant could complete the prompt with the removal of an existing feature or aspect.

Despite the open-endedness of the prompt, answers were expected to fall into several categories. One category was expected be related to the website improvements, such as an aesthetically attractive interface. We also anticipated the desire for new features and tools that have been successful in social media, such as the profile completeness criteria in LinkedIn. Implementation and decisions related to this feedback could be handled by the technology team. We would have to wait to decide how to handle feedback related to the broader program, but we anticipated that some examples

might be audience targeting, revenue generation, and governance.

Rating Questions

The next questions considered by the committee was how the generated ideas should be evaluated by the participants according to one or more rating questions that we define. It was agreed that the most important attribute of an idea was the group's opinion of importance, regardless of whether it could be implemented or acted on. Evaluating whether it could actually be implemented or acted on was left to a second rating question of feasibility.

Unlike a more focused prompt about the website, which could be evaluated solely by the technology team, feasibility of responses related to the MarketMaker program would need to be evaluated by a broader group. Trying to predetermine who those decision makers were was very difficult without knowing what the statements would be. For instance, if the non-website questions were how education about MarketMaker should be carried out, then we would want to have educators evaluate the feasibility of those ideas, but we could not select those evaluators until we knew what type of ideas would need to be evaluated.

That question also raised the issue that if the feasibility of each type of idea could only be evaluated by a small number of specialists, then the validity of the results may be

compromised. On the other hand, allowing a larger group to evaluate them raises the question of whether the ideas are being evaluated by those with sufficient knowledge and perspective. So it presented a validity tradeoff between the quantity and quality of the rating.

We therefore chose to open both the rating of importance and feasibility to all participants. To avoid the potential of having opinions about feasibility from participants without the necessary knowledge or perspective, we added a demographic question related to role, listed above. This would allow us to separate and analyze feasibility ratings from various perspectives, including that of the technology group and other decision-making bodies.

The two rating questions used were as follows:

1) Please rate the importance of each statement from your perspective.
2) Please rate the feasibility of each statement from your perspective.

Both ratings were accomplished with a Likert response format on a scale of 1 to 5. An image of the importance rating form, with instructions and rating labels, can be seen in Appendix F.

Pilot

The project committee then conducted a pilot of the study. After we agreed on the research question, target audience, demographic questions, focus prompt, and rating questions, I configured and prepared the CSGM project website for the participants. As a pilot, the project committee was invited to create an account, answer the demographic questions, and generate ideas in response to the focus prompt.

The site worked as expected and no further changes were made. Because the pilot participants were also eligible to participate in the brainstorming process, their initial ideas were used to seed responses from other participants and were kept in the final statement set. It was agreed that the pilot would be opened to all participants, announced via an email invitation and presentation during a partner conference call.

Institutional Review Board

The final step of preparation was approval by the Institutional Review Board (IRB). Since I was a Cornell University student but also a University of Florida employee, which was also a major stakeholder in the study, there was some discussion as to which board should review the project before commencing. It was decided to submit it to the Cornell University board, since I was conducting the study primarily as a student. After consulting with a Cornell IRB representative, an abbreviated informed consent page was configured on the project website with the following text: "This

research is designed to gather and synthesize feedback related to MarketMaker. Participation is voluntary and confidential".

An application was then submitted which stated that data provided by participants would not be connected with personally identifiable information. Participants could self-register without using their name or identifiable information, and the CSGM software collects the participant information and the aggregated participant data in separate files. The application was submitted with a request for exemption from full IRB Review, which was approved according to Cornell IRB Policy #2 and under paragraph 2 of the Department of Health and Human Services Code of Federal Regulations 45CFR 46.101(b).

Assumptions and Limitations

The expectation of the project committee was that participants would answer the focus prompt with ideas primarily related to the website but would also consider broader ideas related to the entire MarketMaker program. We expected to generate a list of ideas that would cover a spectrum of current efforts, from projects that could be implemented in the near term to those that would be long-term or aspirational goals. Once the concept mapping project started, however, we had limited ability to clarify the intention or expectations.

Invitation

The email invitation (Appendix G) was sent to the MarketMaker partner list, which included primary contacts at each of the participating institutions as well as the technology team. To reach end users and those in the private sector who used MarketMaker but were not involved in its development, we sent an email to all registered users and included an announcement in the regular newsletters to the same group. Patton calls this broadcast invitation a convenience sampling technique (Patton, 1987), and we felt that in combination with the targeted communication to known stakeholders, that it would reach a representative population. Once the project preparation was completed, we moved on to generate the data.

Generation of Data

Brainstorming

The concept mapping process uses brainstorming to produce the raw data, with participants creating statements using a web-based brainstorming process that is virtually identical to an in-person process. Just like traditional brainstorming, participants can submit as many statements as they like and all submitted statements are considered valid (Coxon, 1999; Osborn, 1948).

Participants were invited to complete the focus prompt: "One specific thing that would make MarketMaker valuable to me or my audiences is …" They could remain

anonymous as individuals and or as groups, and the online platform allows participants to see each other's anonymous input as it is submitted. Participants were given a period of four weeks to contribute ideas at their convenience to the online project website. Ninety participants generated 182 responses.

Data Reduction

This final statement set was then reviewed to make sure the statements were easily understood, concise, and had similar syntax. It is recommended that a set of 100 or fewer is best, so that the subsequent project phases are not too cumbersome for participants to process the data (Kane & Trochim, 2007, 2009). A manual process of abstraction-based summarization with keywords was therefore used, similar to Keywords in Context (Krippendorff, 2004). Care was taken not to reduce the statement set too far, and to maintain the full breadth of ideas submitted.

To accomplish this process, the statement set was first entered into an Excel spreadsheet so that each statement could be evaluated and potentially edited in the context of the full set of statements. Any compound ideas were decoupled, and some incomplete statements were eliminated, especially if the complete idea was obviously resubmitted. The statements were then manually coded with keywords. Keywords and their associated statements were then categorized so that similar statements could easily be compared and potentially edited.

Repetitive and duplicate statements were combined, and some minimal editing was also done to make the statements clear, concise, and easily evaluated by the participants. The set of statements was eventually synthesized to 91. To prepare them for the next phase of the process, the statements were uploaded to the CSGM site and ordered randomly for the structuring phase.

Structuring of Data

The third phase of the concept mapping process is called structuring, and it enables the participants to individually process the data so that it can then be aggregated with other participant data, analyzed, and interpreted. In this project, structuring included three steps: sorting the data into categories, importance rating, and feasibility rating. All three steps were conducted online, and the sorting was conducted online and in person.

The data from the demographic questions discussed above is associated with the data produced from the sorting and ratings. Participants could create an account at any point and answer the questions, however.

<u>Sorting</u>

The project committee considered how to make the best use of the one in-person

gathering we would have at an annual meeting in Chicago. Because the sorting might require more instruction and generate more questions or difficulty, it was decided that sorting would be the phase that was most important to offer in person. The meeting was also an opportunity to present to the attendees the background of the project, the concept mapping process, the results of the brainstorming phase, as well as what the next steps would be.

Twenty-two participants attended in person with four more by telephone. All members present completed an online registration, and so acknowledged the informed consent. An email invitation to complete the sorting was sent to the same groups as for the brainstorming phase, as well as to everyone who had registered on the CSGM site.

In the sorting phase, participants sort the final statement set into any number of conceptual groups and provide a name for each one. For the sorting, each participant groups the statements into groups in a way that makes sense to them (Coxon, 1999; Rosenberg & Kim, 1975; Weller & Romney, 1988). I reiterated that the following phases would allow them to rate importance and feasibility, so that their sorting should be according to the way they view the similarity of the statements.

The CSGM software allows the participant to create, delete and name new groups and

to move statements from one group to another. This is helpful as people's perception of how each statement fits into the context of the complete statement set might change as they sort the statements and develop the groups. It was suggested that they might want to read through the list of statements before sorting, to become familiar with the breadth of statements and what groups they might use.

I instructed the participants to read the 91 statements and drag each statement, one by one, to a group that they create. I suggested that they name the group early on to avoid confusion, and to adapt the name as needed. I explained, perhaps unnecessarily, that the statements could not all be placed into one group, that not every statement could be in its own group, and that a group should not be used for the leftover statements or miscellaneous, etc. Every statement, I explained, should be placed intentionally into a group. There were no questions about the process and the participants began the sorting, fortunately staying in their seats as the tables were large enough to allow them to work independently.

Technical support had been arranged in advance to reset passwords and solve any problems, which proved necessary as seven people had registered but could not remember either their user name or password. Twelve people had trouble completing the phase online, particularly those with iPads who had trouble dragging and dropping items and chose to complete the work on paper. Envelopes were prepared in

anticipation of technical difficulties, including instructions, print outs of the complete statement set, and forms to record statement numbers and the groups into which they were sorted. Ultimately, everyone present and those participating remotely by phone were able to complete the sorting phase.

The 10 paper sorts were then entered into the CSGM platform, to complement the other 20 that were completed electronically. In order to maintain anonymity, the forms did not include names of the participants. This made it impossible to associate their sorts with their profile or rating in the online system, but that is not a requirement for the subsequent analyses. The online sorting was left open for one month to afford everyone the opportunity to complete it.

Rating

The next participant phase of the concept mapping process is rating. It may include one or several ratings according to evaluation metrics, such as importance, feasibility, effectiveness, or cost. The project committee settled on rating importance and feasibility as the questions to be evaluated, and both were conducted online. An invitation was sent to all participants through the CSGM platform, to all MarketMaker stakeholders through the newsletter, and directly by email.

The ratings are similar to a Likert response format, with five possible scaled responses

for each statement, so minimal instructions were necessary. The instructions to rate importance were to "Please rate the importance of each statement from your perspective." The scale was explained as 1=Very important and 5=Not Important, according to radio buttons on the same line as each statement. Likewise, the directions for feasibility were to "Please rate the feasibility of each statement from your perspective." The scale was explained as 1= Very Feasible and 5 = Not Feasible, according to radio buttons on the same line as each statement.

The pilot committee decided to use these scales, which are reversed from the typical process, because 1 seemed intuitively more important and more feasible than 5, as in a higher priority. This decision resulted, however, in a somewhat counter-intuitive output that is discussed in the results chapter. For instance, it meant that the "Go-Zone" map showed the most important statements in the lower left corner, rather than the upper right corner, where it might ordinarily be expected. Possible implications for this discussed in chapter 4.

Analysis of Data

Once the participants generated and then structured the statements with sorting and rating, the aggregated data was analyzed to create graphical representations or maps using the CSGM website. The resulting maps represent not only the input from individuals, but also the synthesized consensus from the group. Since each of the data

points can be traced to specific input from anonymous individuals, it fosters trust, support, and accountability from the stakeholder community. This section describes the analyses that were conducted in advance of the interpretation session with the stakeholders. These include a sequence of steps to create the concept maps and reports: a point map; cluster maps; point rating maps; cluster rating maps; Go-Zones; and pattern matches.

Similarity Matrices

The first step in the analysis is the use of the participant sorting data to construct a similarity matrix that shows the frequency with which statements were sorted together by each participant (Kane & Trochim, 2007).

For each of the 30 sorters, a grid or square table would have a row and column for each of the 91 statements. A binary value would then be entered in each cell, or at each intersection of a row and a column. A 1 would be entered if the two corresponding statements were grouped together and a 0 would be entered if they were not grouped together. The resulting table is called a binary symmetric similarity matrix. Since it may be easier to understand the matrix with a visual representation, the first 30 rows and columns can be seen in Appendix H.

The individual matrix for each participant can then be stacked with the other

participants to create a combined group similarity matrix (Coxon, 1999; Rosenberg & Kim, 1975; Weller & Romney, 1988). The values for each cell are added to determine the total similar value across all participants. In the combined similarity matrix, the table would be 91 cells long by 91 cells wide by 30 cells deep.

In the individual matrices, the higher value of 1 indicates similarity, relative to a 0 for non-similarity. A higher combined value for any pair of statements, up to the number of sorters (N=30), therefore indicates a higher conceptual similarity.

Multidimensional Scaling

A two-dimensional nonmetric multidimensional scaling is then used to place the points in the combined group similarity matrix along a two-dimensional (X, Y) grid (Davison, 1983; Kruskal, 1964a, 1964b; Kruskal & Wish, 1978; Messick, 1954). Any number of dimensions could be used, up to the number of statements minus one, or 91 in the case of this research. Two dimensions are easier to work with (Kruskal & Wish, 1978) and the emphasis of the concept mapping process is on relationality rather than dimensions (Kane & Trochim, 2007).

These steps produce a point map, the most fundamental map upon which the other concept mapping maps are built. Each point represents a statement, typically with its corresponding statement number. The proximity of points to each other is

determined by how many participants grouped them together, indicating how participants view the relationship of each statement to each other.

Hierarchical Cluster Analysis

The X, Y coordinates from multidimensional scaling are then used as inputs for a hierarchical cluster analysis to draw boundaries between clusters of points. Using Ward's algorithm, this process partitions the point map into non-overlapping groups to create a cluster map (Anderberg, 1973; Everitt, 1980). The cluster map can be transparently overlaid on the point map to show the individual ideas that constitute the cluster, with each cluster representing a similar concept.

The number of clusters is not determined by the algorithm, however. That must be determined by the researcher or participants, although a process may be used to guide the decision. A divisive process starts with all points in one cluster and breaking each cluster into two until doing so would separate similar ideas. An agglomerative process, as is used in Ward's algorithm, starts with each point in its own cluster, and clusters are merged one by one until the points within them no longer make sense together as a single concept.

There is no correct or incorrect number of clusters, and different algorithms and different stakeholder groups might arrive at different numbers of clusters as the ideal

solution. In fact, multiple solutions may be useful to include for the interpretation phase. Some of the solutions may include clusters of clusters, showing multiple levels of clustering (Kane & Trochim, 2007). As long as there is not direction given to the participants about the number and meaning of sorting piles, then determining the number of clusters is a subjective decision.

Cluster Labels

Likewise, there is no single correct name for each of the clusters. The name of each one can be determined by a variety of factors. A suitable name may come from one of the names provided by the participants, one of the statements in the cluster, the researcher's understanding of the cluster, a name suggested by CSGM or other analyses, or a decision process by the stakeholder group (Kane & Trochim, 2007). The researcher or committee may explore the various scenarios in advance of the interpretation phase for both the number of clusters and their labels.

The CSGM application suggests cluster labels through a calculation of centroid locations. It first determines the centroid for each cluster in the map by calculating the average of the *x* and *y* axes for all the points in the cluster. Then it uses the MDS calculations for each participant and calculates the centroid of each of their piles. If 8 participants, for example, each sorted the statements into 6 piles, then the software would calculate the centroid for each of the 48 piles. For each cluster centroid on the

map, it finds the participant pile centroid that is closest to it and uses that participant's pile title. The software also provides the top ten names determined by the ten closest centroids, defined by the shortest Euclidean Distance between the cluster centroid and pile centroids.

Bridging Analysis

A bridging analysis helps explain why statements were placed where they were on the point map. A point may be placed near other points because many participants sorted them together. That point would in that case be considered an anchor for that part of the map because it represents the statements around it well. Alternatively, a point could be placed where it is because it is midway between two or more relatively distant points that participants saw as related, and that would be considered a bridging statement. The bridging values are calculated by the CSGM application and help explain whether a point is most closely related to the points in the immediate vicinity or if it might reveal more about the expanse of the relationship.

The computation of the bridging value involves several steps that utilize the data from both MDS and HCA, It was developed by William Trochim for the concept mapping process and is not easily found in the literature, so the process is described below according to unpublished documents prepared by Trochim.

The process begins by computing the proportion of participants who sorted two points (*i, j*) together by dividing the number of people who sorted *i* and *j* together, divided by the total number of participants who sorted, as in the equation below:

$$p_{ij} = \frac{s_{ij}}{m}$$

where

p_{ij} = proportion of sorters who placed points *i* and *j* together in the same pile
s_{ij} = number of sorters who placed points *i* and *j* together in the same pile
m = total number of sorters

The Euclidean Distance is then computed between all pairs of standardized points using the following formula:

$$d_{ij} = \sqrt{(x_i - x_j)^2 + (y_i - y_j)^2}$$

where

d_{ij} = standardized Euclidean Distance between points i and j
x_i = MDS x-coordinate for point i
x_j = MDS x-coordinate for point j
y_i = MDS y-coordinate for point i
y_j = MDS y-coordinate for point j

To calculate the raw, unstandardized bridging value, the proportion of participants who sorted *i* and *j* together (p_{ij}) is multiplied by the distance between all pairs of standardized point *i* and *j* (d_{ij}), and the result is divided by the sum of p_{ij}, as follows:

$$b_i = \sum_{j=1}^{n} \frac{(p_{ij} * d_{ij})}{\sum_{j=1}^{n} p_{ij}}$$

where

b_i = bridging raw value for point *i*
p_{ij} = proportion of sorters who placed point *i* and *j* together in the same pile
d_{ij} = standardized Euclidean Distance between points *i* and *j*

The raw bridging value is then normalized to a 0-1 scale with the following formula:

$$b_i = \frac{b_i - \min(b)}{\max(b) - \min(b)}$$

where

b_i = bridging raw value for point *i*
min(b) = minimum of the b_i values
max(b) = maximum of the b_i values
b_i = standardized bridging value

A statement with a low bridging value (0) indicates that it was placed in its location by the algorithm because it was sorted with other statements that are near it. It is considered an anchoring statement, as it reflects the area of the map around it. A statement with a high value (1) indicates that it was place in its location because it is between other distant statements with which it was sorted. It is considered a bridging statement, as it relates more to the parts of the map that it connects (Kane & Trochim, 2007).

Interpretation Preparation and Presentation

Several steps were taken prior to the interpretation phase. A history of the project was prepared for those who may not have participated or for others who wanted a reminder. The maps from the core analysis were prepared for presentation, including the point map and cluster maps. The point map was illustrated with several statements to highlight the expanse of ideas and the spatial relationships between them.

Maps from the cluster analysis were prepared with eight, six, and four clusters. The labels generated by the CSGM application were initially used and then altered based on discussions with the project committee. Once the point and cluster maps were finalized, several additional maps could be produced. These included data from the rating phase and demographic information provided by the participants.

The rating data was totaled and averaged to create rating maps, based on the participant rating of importance and feasibility. This can be used to add a dimension of either rating metric to the point and cluster maps. Each statement and cluster can be given a vertical dimension to reveal how important or feasible each was according to the participants. This can also be done for participant subgroups, per the demographic variables. The maps and reports that can be produced include point rating maps, cluster rating maps, Go-Zone displays, and pattern matching displays.

Go-Zone plots compare the ratings of statements within the complete set or within clusters. The data is displayed on a bivariate scatter plot, with statements divided into four quadrants defined by the mean rating of each criterion. One quadrant is defined by a below mean rating according to both criteria, two quadrants have above mean ratings by one criterion by below mean rating by the other criterion, and one quadrant has an above mean rating on both criteria.

This last quadrant is the "Go-Zone" of statements which had consensus regarding the two ratings. While this zone is typically in the upper right quadrant, it was in the lower left quadrant for this study because the rating scales were reversed.

The Go-Zone is particularly valuable when the outcome of the project is expected to inform strategic planning process or to develop an action plan for the participants. Pattern matches can also be used to reveal differences between different demographic groups by comparing the way they rated various clusters. Priorities can be compared for managers versus staff, for example (Kane & Trochim, 2007). These concept maps and reports are discussed in the next chapter.

Conclusion

This chapter discussed the first four of the six phases in the concept mapping methodology, including preparation, generating the data, structuring the data, and

analyzing the data. The results from these phases and the final two stages of interpretation and utilization are discussed in the next chapter.

CHAPTER 4: Results

Introduction

This chapter discusses the results of the concept mapping process described in Chapter 3, including the data generation, structuring, analysis, and visualization. The demographics and participation rates of the study participants are described as well as the results of each phase.

Participants

The data of 129 participants were entered and analyzed on the CSGM website. This includes those who may have started a phase but not finished, as well as individuals who may have a duplicate profile for different phases. Descriptions of their aggregated demographics and feedback are described below. The number of individuals who completed at least one phase is 112, and related statistics are described below as well.

Demographics

The study participants were expected to be diverse, so participants were asked non-identifying demographic questions in order that the results could be viewed from the perspective of different stakeholder subgroups. MarketMaker stakeholders include a diverse mix of backgrounds and perspectives, as discussed in Chapter 2, and the

invitation for the study encouraged people to forward it to those who might be interested.

The demographic questions were intended to provide insight into the spectrum of backgrounds included among MarketMaker stakeholders and to enable the option to analyze the results according to subgroups to understand how demographic factors might be correlated with particular perspectives and priorities.

Six questions were asked, centered around institutional affiliation, geographic location, and role. At the time the CSGM website was prepared, questions did not allow the selection of multiple answers. This complicated the way questions were set up because we knew that some people might not fit neatly into one answer. This limitation was handled differently in each of the questions to try to obtain the most valuable information from the participants. The six questions included the following:

What institution are you affiliated with?

What state do you primarily work in?

Is the region you focus on rural? (The next 2 questions ask about urban and coastal)

Is the region you focus on urban?

Is the region you focus on coastal?

What is your role?

The intention of the first question was to determine which type of institution the participant was affiliated. The possible answers included:

MarketMaker partner organization, Land Grant University, Riverside Research

For-profit business (producer, processor, wholesaler, distributer, retailer)

NGO, government

Other

The first answer option encompassed those who were part of the partner group and it comprised half of all the participants. For-profit businesses accounted for about 30% of the participants. The details of each group are illustrated below in Figure 1.

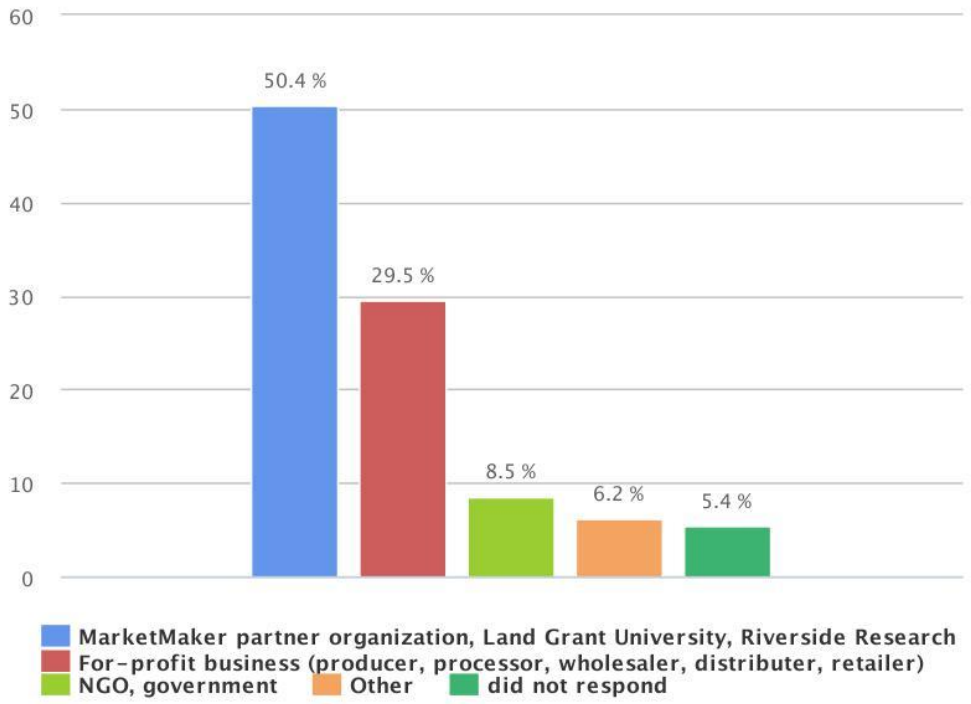


Figure 1. Participation by Institutional Affiliation

The next four questions focused on two aspects of geography; US state and geography type. MarketMaker stakeholders extend across much of the United States, and these questions would allow us to see how geography might impact the way participants prioritize ideas.

The first geography-related question asked, "What state do you primarily work in?" and the possible answers included the 50 United States as well as an option for multiple states. The multiple states option was to account for people who may work near a border and work in a local area covering multiple states, those who have multi-

state responsibilities, as well as those work in a capacity that is not defined by the geography.

The participants indicated that they came from 21 states and 11 participants selected the multiple states option. The strongest participation came from Florida, which is not surprising because of the intense interest in the status of the Florida Food Connect website. The second largest participation level came from Illinois, which is also not surprising because MarketMaker is based there. Strong participation also came from Michigan, Colorado, New York, Indiana, and Texas. A table of participation from all states is shown in Appendix I.

The next three questions focused on type of geography, namely rural, urban, and coastal. This could have been achieved with one question if multiple answers could be selected, but the software required us to ask three separate questions, including:

> Is the region you focus on rural? (The next 2 questions ask about urban and coastal)
>
> Is the region you focus on urban?
>
> Is the region you focus on coastal?

Given that this study was connected to agricultural production and consumption, it is

not surprising that the largest geography types were rural and somewhat urban, presumably reflecting the urbanization trend that many areas of the US is experiencing (Census, 2010). These answer options were not defined, however, and could be seen as relative adjectives.

Table 3. Participation by geography type: Rural, Urban, and Coastal

	Yes	Somewhat	No	No Response
Rural	44 (34.1%)	51 (39.5%)	24 (18.6%)	10 (7.8%)
Urban	26 (20.2%)	70 (54.3%)	21 (16.3%)	12 (9.3%)
Coastal	17 (13.2%)	30 (23.3%)	70 (54.3%)	12 (9.3%)

Finally, participants were asked what their role was. It was though that this might be important if any ideas required support or input from particular groups, which were outlined in the answer options below:

State PI
Researcher
PAC
Outreach/Educator/Facilitator
Tech team

The results from this question are show in the figure below. In hindsight, this question was not formed sufficiently well, especially given its potential value. The very high percentage of no response may be due to several reasons. The question was likely only relevant for the 50.4% of participants who were affiliated with a MarketMaker

partner organization, a Land Grant University, or Riverside Research.

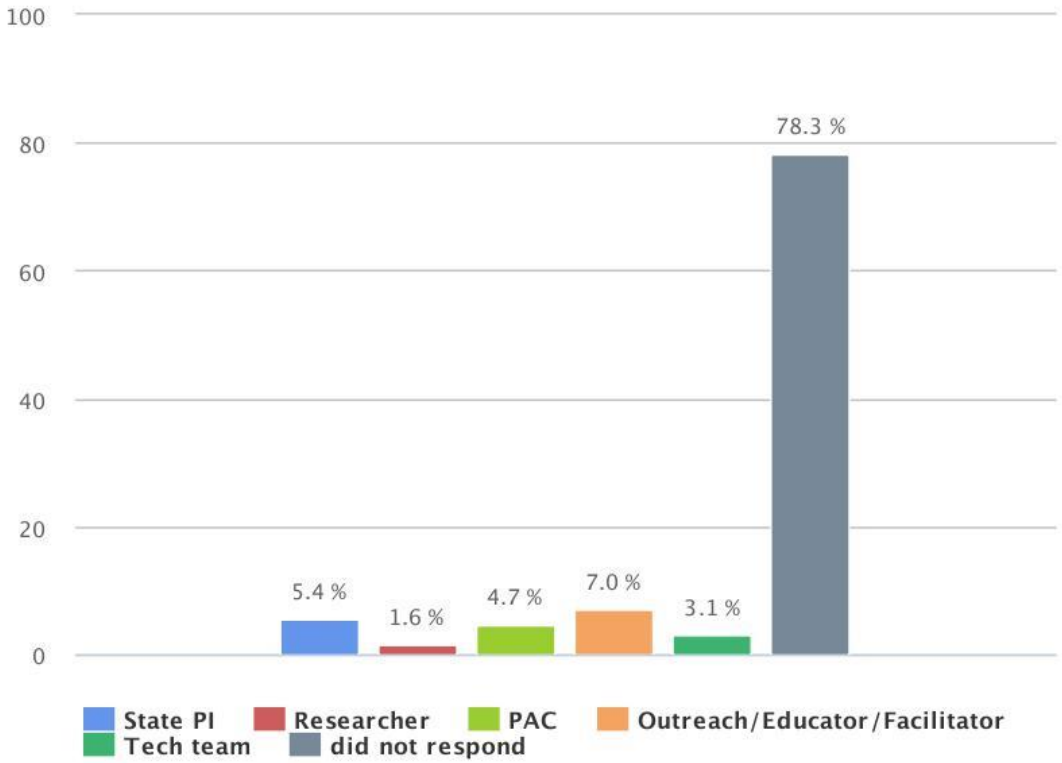


Figure 2. Institutional Affiliation

It also would have benefited from an option to indicate multiple roles, and the absence of such an option may have led some participants to not respond. Finally, it was the last of six questions, so it is possible that participants had lost patience or interest by this point.

Technology Team Participation

One subgroup of particular interest was the participation of the technology team, known to the MarketMaker partners as the "tech team". The stakeholder responses

were generally expected to have a technology aspect, such as changes to the website. Engagement of the tech team was important, therefore, because many of the study results would consequently be handed off to them for implementation. That engagement could entail participation in the process, but their knowledge of MarketMaker issues was generally limited and they were not end users of the site. Their rating of feasibility was the most valuable and familiarity with the concept mapping process was sufficient.

Of the ten members of the technology team, seven registered on the CSGM website and two participated in the feasibility rating. While the participation rate is lower than we would have liked, having 58% of them take the step of registering shows that they were at least aware of the process and would hopefully be more likely to embrace the outcomes of the study. Options for analysis of their feasibility ratings are limited due to the lack of participation.

Participation in Each Phase

An individual is considered a participant in this study if they participated in any of the phases, including Brainstorming, Sorting, or either of the Rating phases. Indeed, we saw participation in a variety of phases that may be easiest to express with a Venn diagram. Each of the three circles in the diagram below represents one data collection phase, with the two Rating phases combined. The numbers within each circle

represents the number of individuals who participated in that phase, and the number in the overlapping portion indicates the number of individuals who participated in the phases that are overlapping.

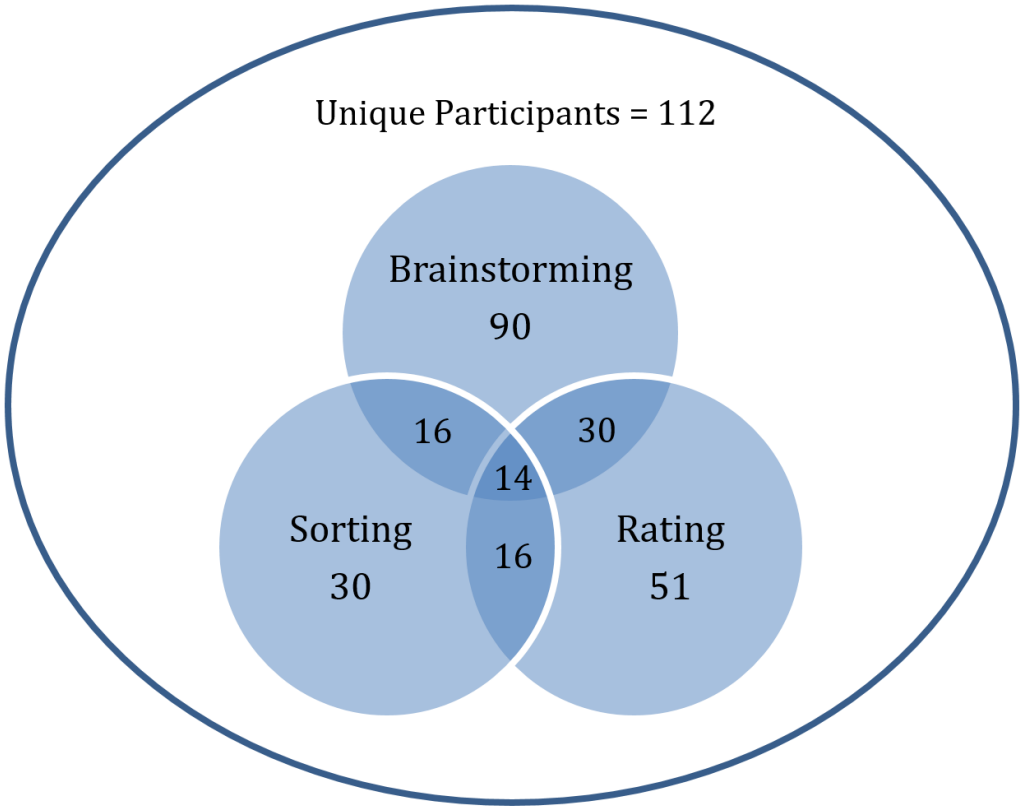


Figure 3. Participation Venn Diagram

It is encouraging that the invitation was sent to approximately 55 individuals and 112 participated, indicating that we were addressing a topic that was of interest beyond the immediate MarketMaker stakeholder group. The 30 sorting participants provided sufficient data to analyze, as Kane and Trochim state that it is best to have 25 to 30

people complete the sorting process (Kane & Trochim, 2007). The importance rating had combined participation of 51, including 49 who rated Importance and 33 who rated feasibility.

This study was meant to improve a website that reaches an unknown and hopefully increasing number of viewers. We therefore do not know what the entire population size is, or their participation rate. Likewise, inclusion in the partner group to whom the invitation was sent is not strict or well defined. Thirty-four of the approximately 43 members of core partner group participated, however, indicating solid engagement with the process.

Brainstorming Results

The brainstormed statements, or completions of the focus prompt, create the first level of data for this study. There were 182 brainstormed statements that were manually screened and corrected for obvious mistakes or grammatical errors. Eighteen statements were removed because they already existed as a feature or aspect of the website, or because they were not clear or specific. Fifty-three were not included as written because they were expressed in other statements.

The remaining statements were then refined using a synthesis and reduction process, combining twenty statements with similar statements. The objective was to reduce the

statement set as much as possible to reduce the effort involved in the subsequent phases, but also to maintain the largest possible conceptual breadth. The ability to combine statements due to redundancy suggests that the range of statements submitted was comprehensive.

Finally, 91 statements were edited for syntactical consistency, uploaded to the CSGM website as the final statement set and randomized. The quantity of statements in each of these categories is listed below in Table4 and the complete list is in Appendix J.

Table 4. Quantity of Statements

Statement description	**Quantity**
Total statements generated in brainstorming	182
Removed because already in website, not clear, or not specific	18
Statements expressed in other statements	53
Statements combined with others in final statement set	20
Final statement set	91

Data Visualization

Once the statement set was finalized and uploaded to the CSGM website, the participants sorted the statements into groups. Participants could sort the statements online with the CSGM software or on paper, after which their data was entered into

the CSGM website. A completed sort on the CSGM website is shown in Appendix K. The data from the participant sorts is used to create the combined similarity matrix described in Chapter 3.

Multidimensional scaling is then used to convert the matrix into a two-dimensional plane, with the spacing between the points representing the relationships between the ideas from the perspective of the stakeholder group. Points closer together on the map were generally sorted together more frequently and vice versa. The result of this process is illustrated in the point map below.

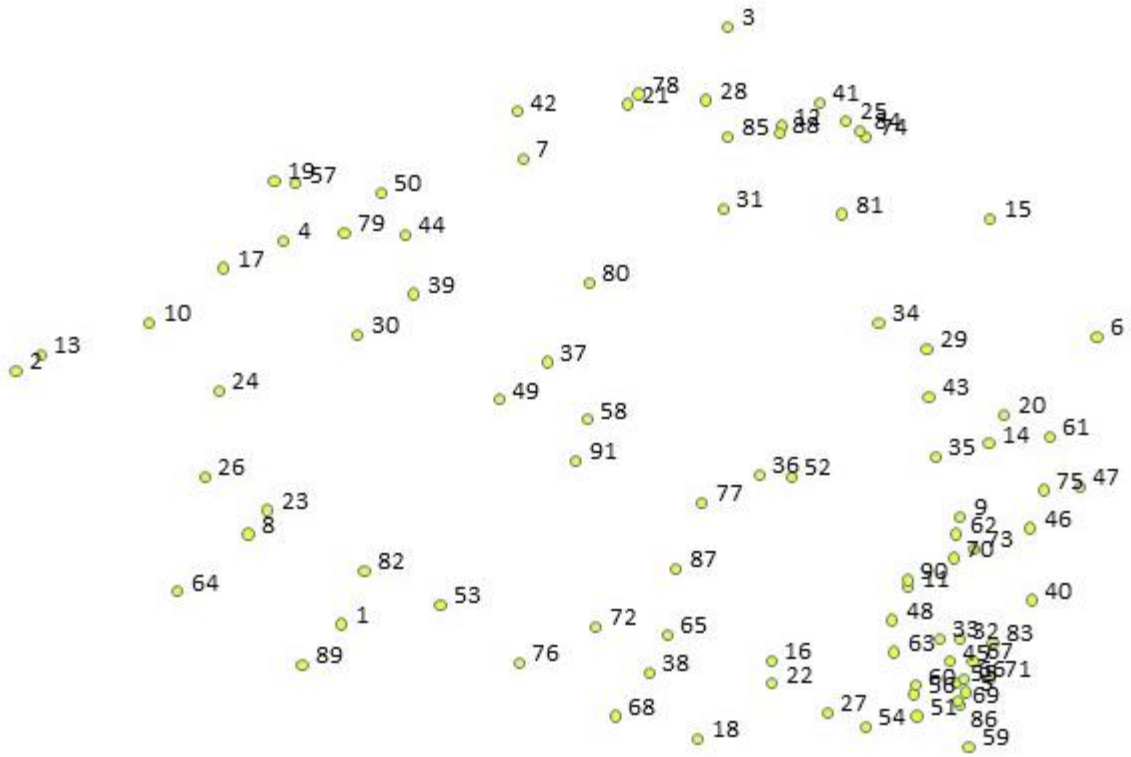


Figure 4. Point Map

Bridging Analysis

There was a range of bridging values in the point map, from 0 to 1. Two examples are provided below. Figure 5 shows statement 2, "to develop and deliver educational workshops for local businesses and farmers, to ensure they know about MM and its value." With a bridging value of 1, it is a strong bridging statement.

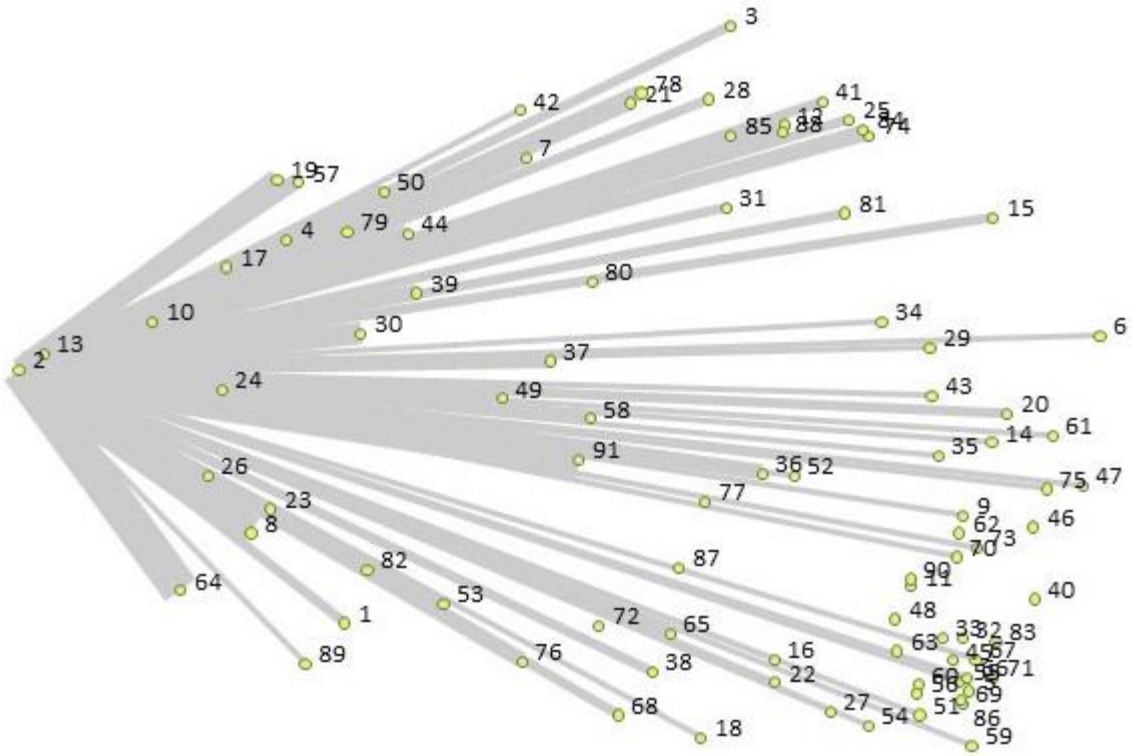


Figure 5. Example of Bridging Statement

Figure 6 below shows statement 5, "to make the site navigation easier and more focused". With a bridging value of 0, it is a strong anchoring statement.

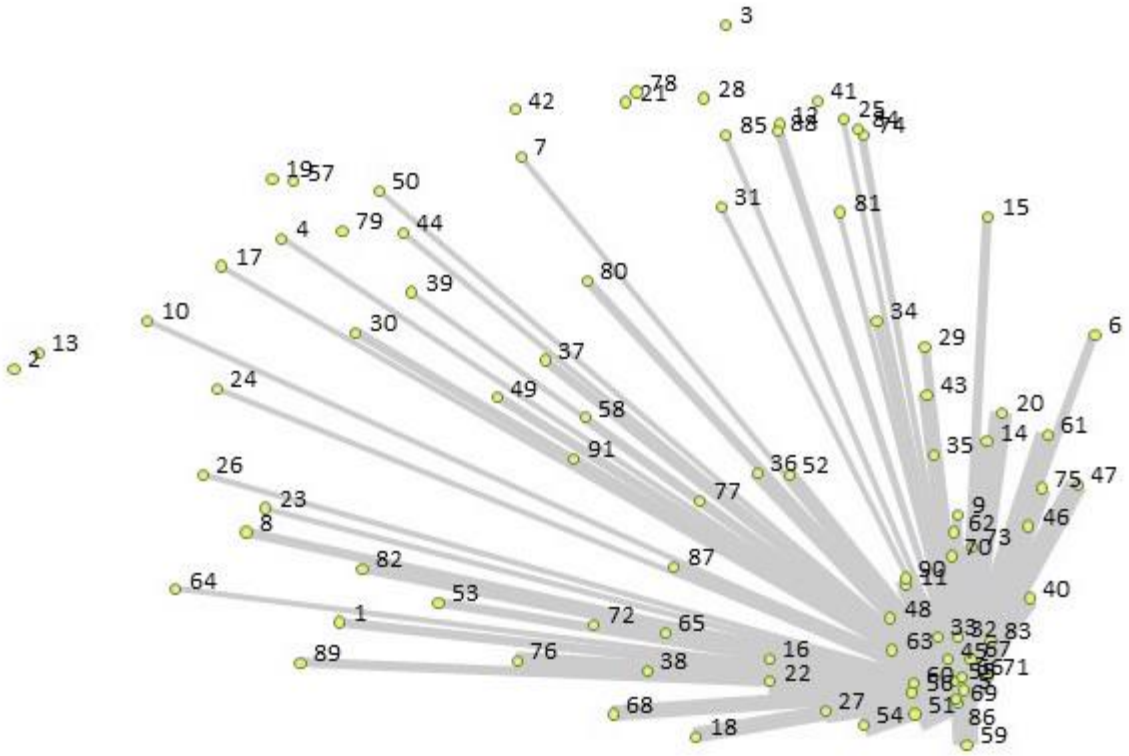


Figure 6. Example of Anchoring Statement

A diagnostic statistic that indicates how closely the point map fits the similarity matrix is called the stress index, and a lower the index generally indicates a better fit (Kruskal & Wish, 1978). The stress index for this point map is 0.2590. This compares well to the meta-analyses of concept mapping projects, which show average stress index of 0.285 with a standard deviation of 0.04 (Trochim, 1993), 0.28 with a standard deviation of 0.04 (Rosas & Kane, 2012), and 0.26 with a standard deviation of 0.05 (Donnelly, 2016).

Cluster Analysis

Once the point map was created, the points were delineated into clusters with hierarchical cluster analysis. Options for the number of clusters were explored on the CSGM website and the number of clusters that made the most sense to the project committee included a range from 8 to 4, shown below in Figures 7, 8, and 9.

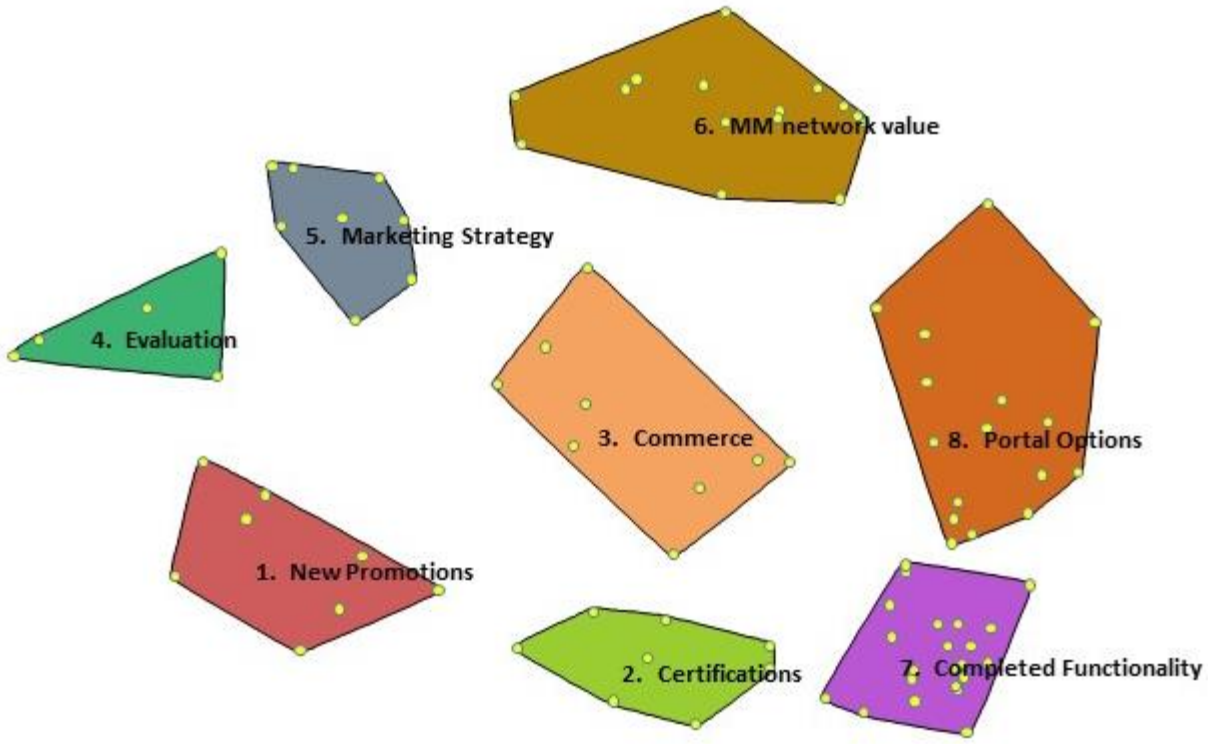


Figure 7. 8-Cluster Map

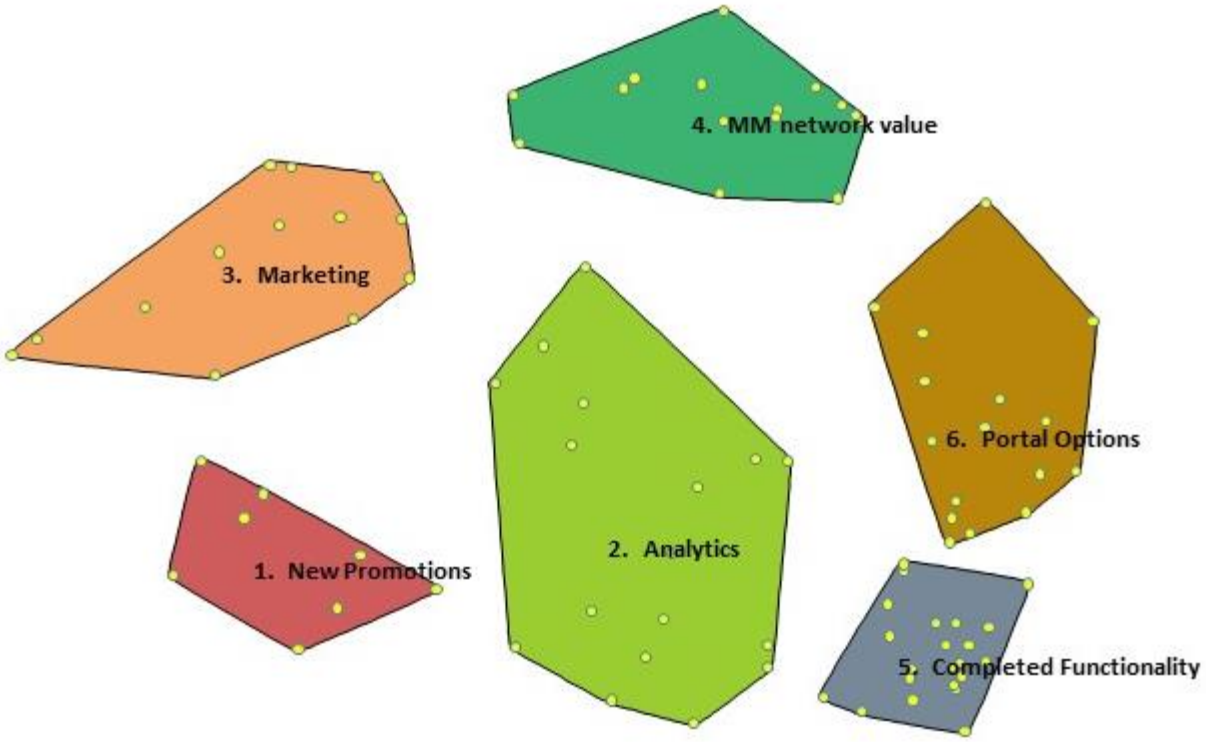


Figure 8. 6-Cluster Map

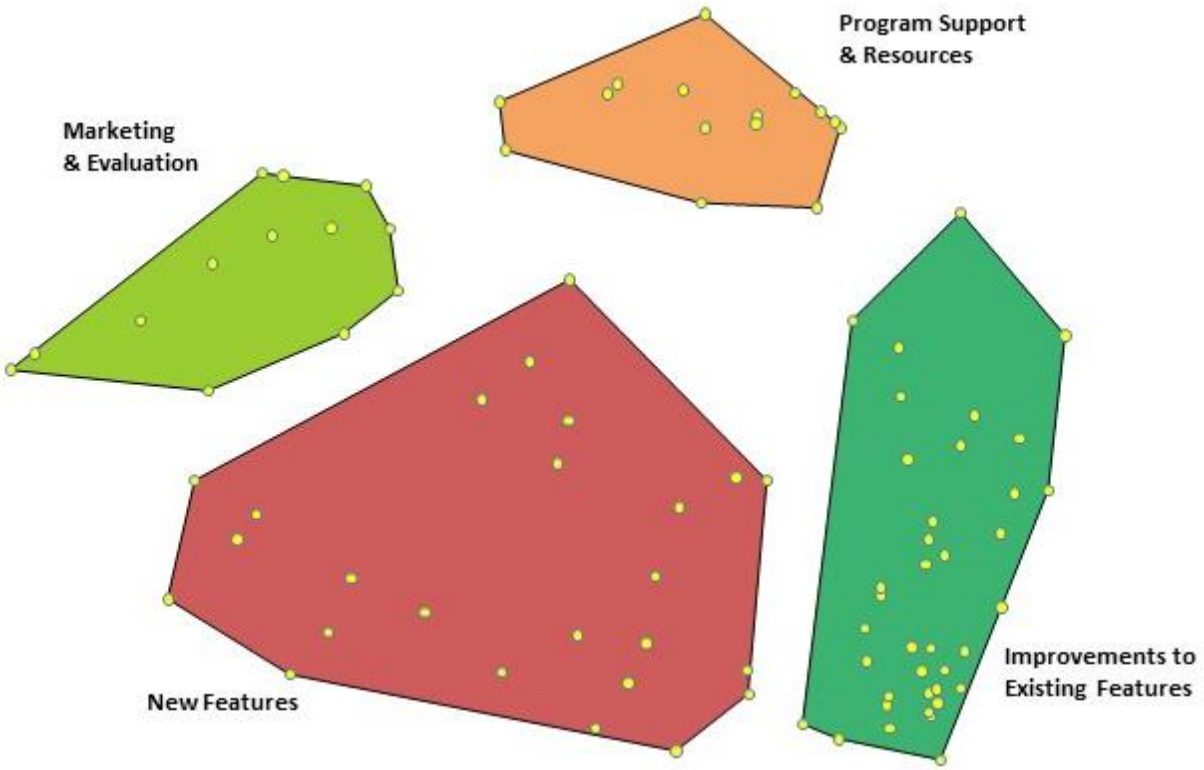


Figure 9. 4-Cluster Map, Renamed

As described in the previous chapter, the CSGM application generates a name for each cluster as well as the top ten names from the closest centroids. These were interesting for discussion purposes, but the final names chosen for the clusters were not exactly what was provided by the software. The top ten names generated for each of the four clusters are listed in Appendix L.

The names that were ultimately chosen aligned well not only with the statements in the clusters, but also with the three MarketMaker committees that existed and would be most concerned with taking action on the ideas within the clusters. These included

the technology team for the two technology-related clusters, the Research and Evaluation Committee for the Marketing & Evaluation cluster, and the Policy Advisory Committee for the Program Support & Resources cluster.

One further division from the participant perspective is useful for the discussion below. Of the four clusters in the map, the two clusters on the top half of the map are more closely related to each other than they are to the two on the bottom half. Likewise, the two clusters on the bottom are more closely related to each other than they are to the two on the top. The two on the top are generally program related, whereas the two on the bottom are generally technology related. This is illustrated in Figure 10 below.

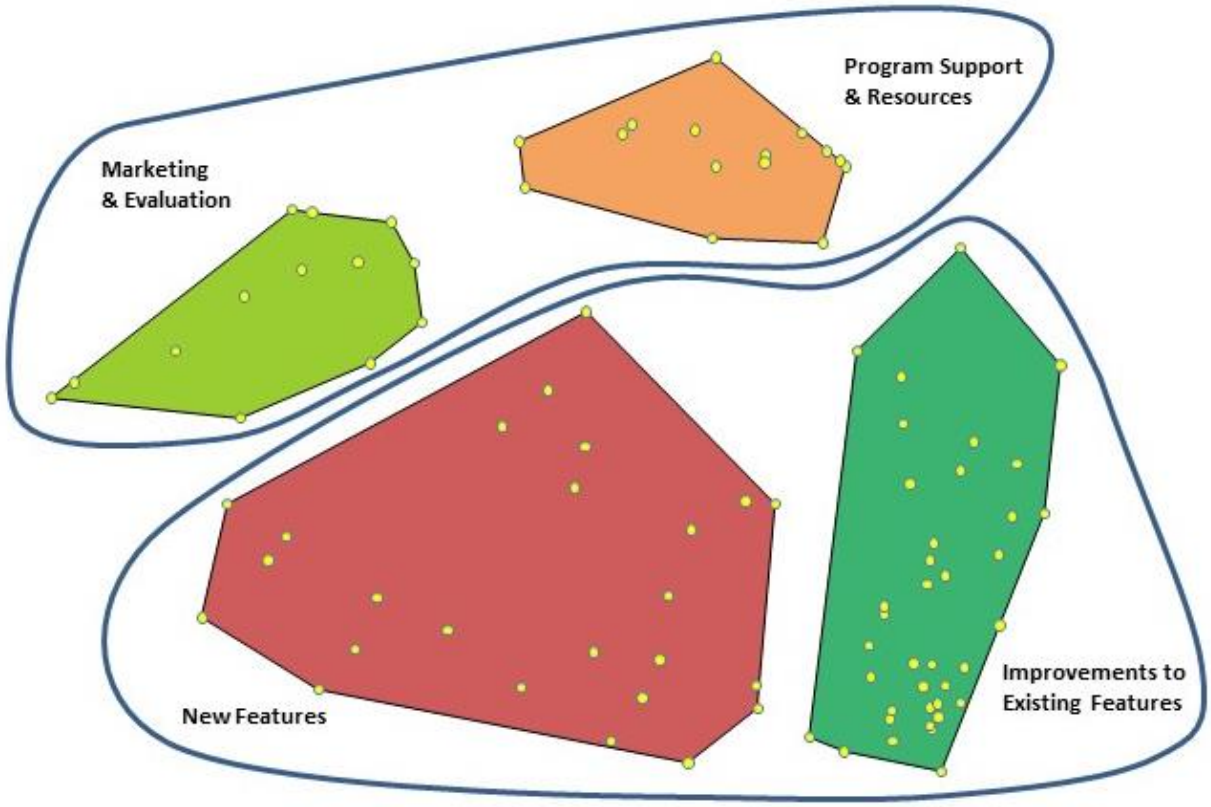


Figure 10. Cluster Map - Program and Technology Related Clusters

Rating Results

All participants were asked to rate the statement set two separate times, according to importance and then feasibility. Several ways that this rating data can be represented are discussed below. Because the Likert response format was reversed in the instructions and rating form, the rating indicators in the results are also reversed. A low importance rating, for instance, is low on a vertical importance scale and vice versa.

This raised the question of whether participants might be accustomed to a Likert response format with the most important or most feasible rating being the highest number. In that case, they might have rated the statements according to their past understanding of the scale, rather than following the instructions or the labels on the scale.

In order to answer this, the frequency of each rating score for each statement was analyzed and graphed below. Since the statement set is developed by stakeholders on what they deemed important, and then rated by a subgroup of those same stakeholders, it could be expected that the frequency distribution would tend towards more important ratings. In the case of this study, the more important ratings would be lower numbers, and this is exactly what we see in Figure 11 below.

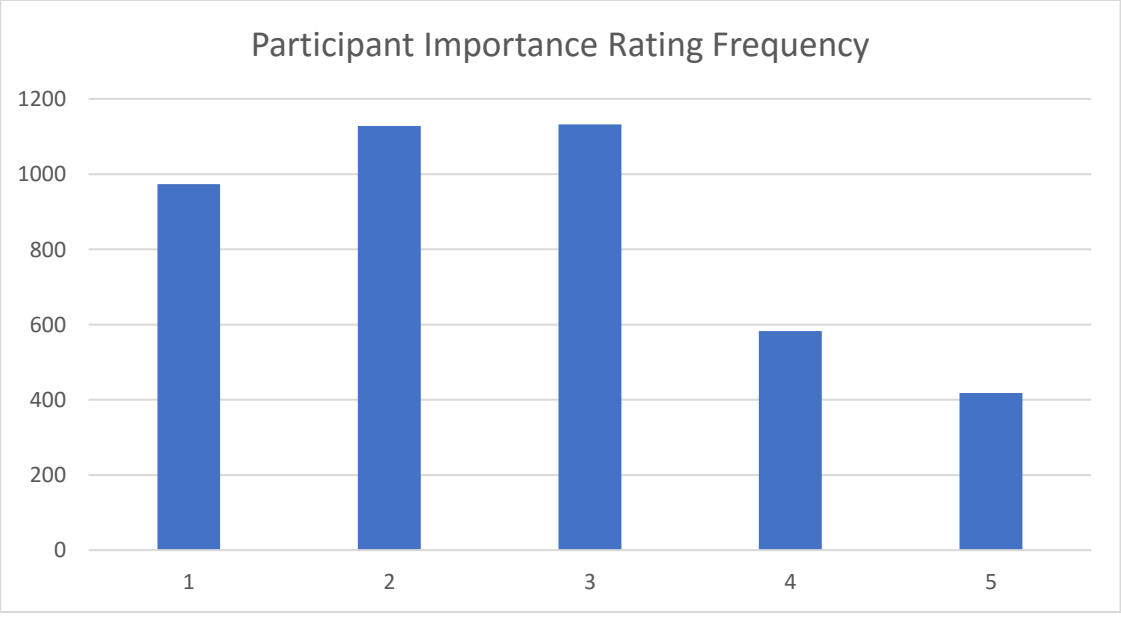


Figure 11. Participant Rating Frequency

Likewise, the average importance rating of all statements was 2.61. This would be more important than the average rating of a 3 on a scale of 1-5. This study's rating response frequencies and higher average rating indicate that the reversed Likert response format does not appear to have reversed the ratings.

Point and Cluster Rating Maps

Participant ratings of statements can be illustrated with point and cluster maps that are stacked with layers indicating the rating. A point rating map uses layers of stacked points on top of each other to indicate how important each one was rated. Likewise, a cluster rating map uses layers of stacked clusters to indicate the rating. An example of each of these is illustrated in Figure 12 and 13 below. These maps can be created with to filter certain groups of stakeholders according to any of the demographic variables that they entered.

Figure 12. Point Rating Icon

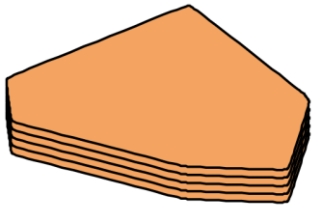


Figure 13. Cluster Rating Icon

Since the ratings are reversed, higher stacked points or clusters in these figures indicates a lower importance or feasibility, and lower stacks indicate a higher rating. The point rating maps show a range of ratings throughout the clusters, and the large number of stacked data points in close proximity in some areas of the clusters can make it difficult to derive meaning. The point rating maps for importance and feasibility are included in Appendix M and N. The cluster rating maps aggregate the ratings of all the points in each cluster, making these ratings easy to see.

The results were somewhat surprising, however. The focus of this study was initially an internal inquiry and focused on the development of the MarketMaker website. It was only after discussions of the focus prompt that the project committee decided to broaden the scope to include the MarketMaker program. Nevertheless, it was assumed that statements related to the website development would be the focus, and by extension, would be deemed most important.

The cluster rating map in Figure 14 below, which includes the importance rating of all participants indicates that the two clusters related to the website are actually of lower importance than the programmatic-related clusters.

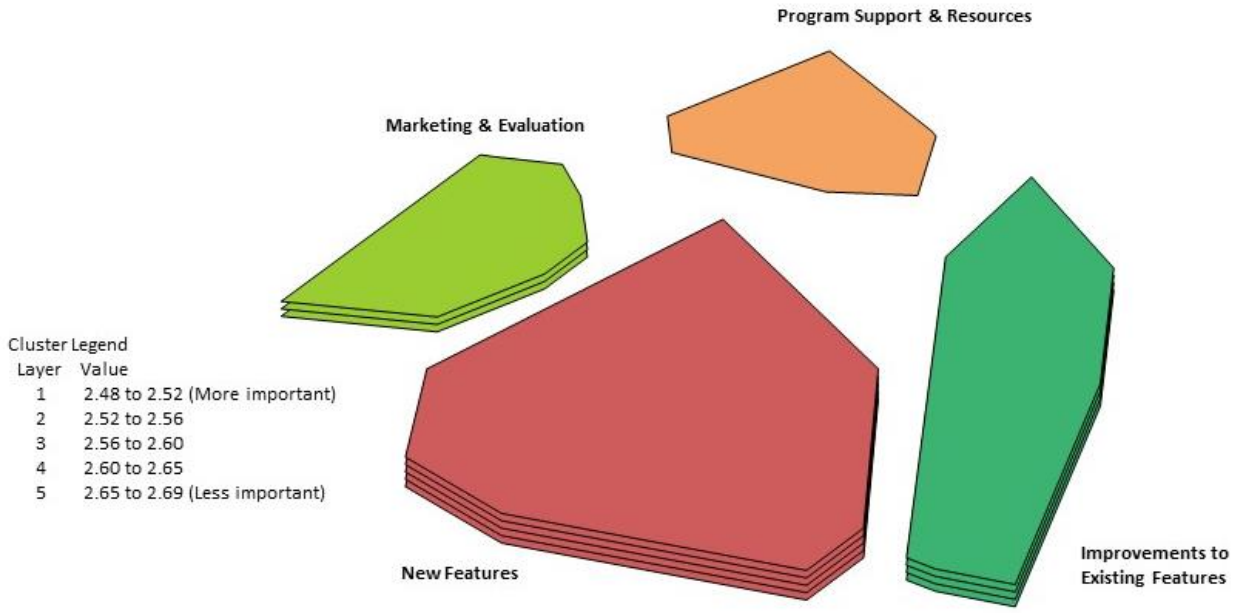


Figure 14. Cluster Map – Importance Rating, All Participants

This was surprising enough that it warranted further examination, which revealed that the ratings were not consistent across participant sub-groups. Figures 15 and 16 show that internal and external participants had different priorities.

The internal group includes the Institutional Affiliation of MarketMaker partner organization, Land Grant University, Riverside Research. The external group includes

the Institutional Affiliation of For-profit business (producer, processor, wholesaler, distributer, retailer).

The two groups rated 3 of the 4 clusters very differently. From the perspective of external participants, the program-related clusters were less important, and the Improvement of Existing Features was rated much higher. The rating of New Features was similar.

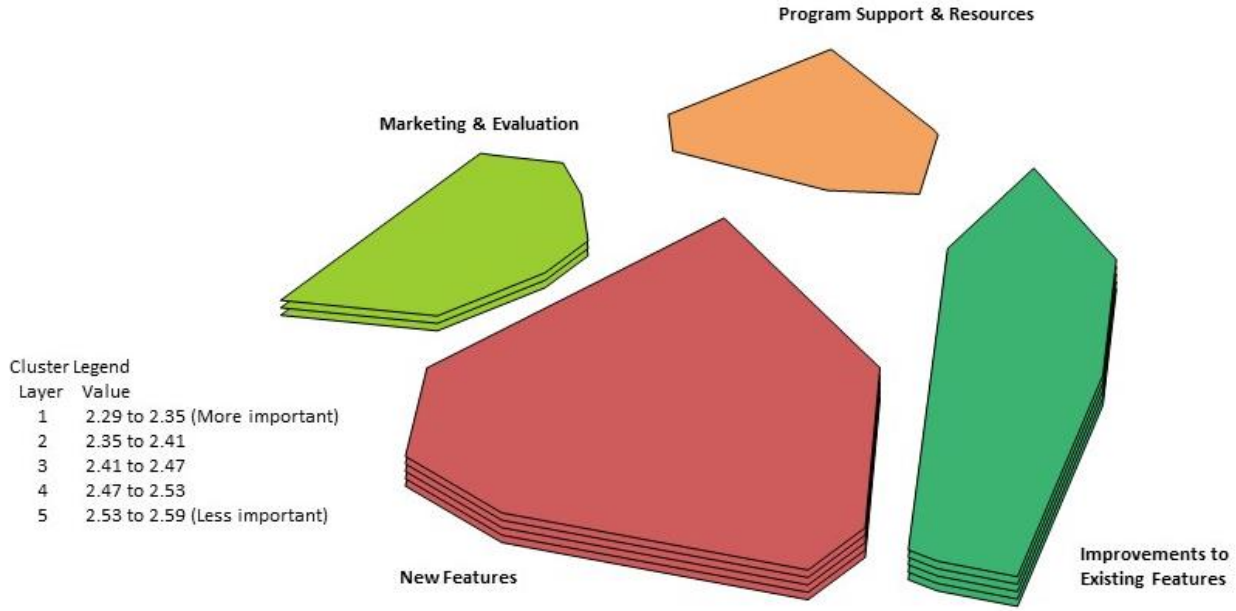


Figure 15. Cluster Map - Importance Rating, Internal Participants

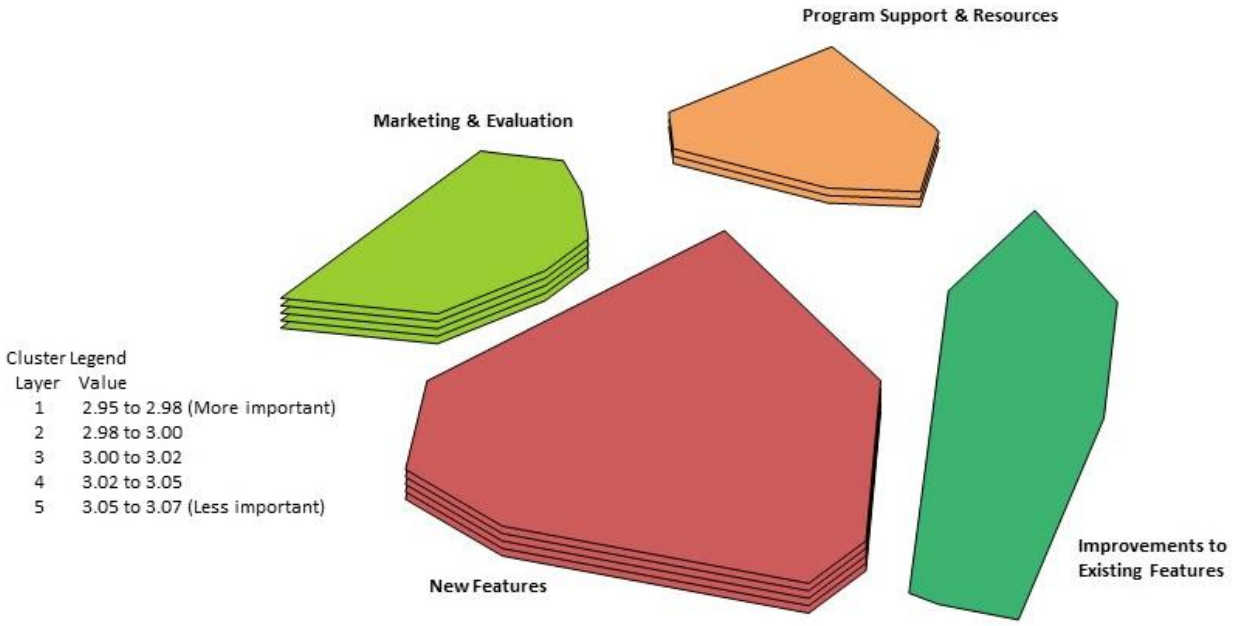


Figure 16. Cluster Map – Importance Rating, External Participants

One way to interpret this is that the internal participants were interested in the internal, program-related statements and the external participants just wanted the website to function better. To the extent that the PIE study and the FFC website had tapped into the true end-user preferences, these results should not be surprising.

It was not apparent from the initial concept mapping analysis because it was obscured by the fact that internal participants dominated the participant group. Internal rating participants comprised 33 (67.3%) of the total, masking the perspective of external stakeholders with just 10 (20.4%) importance rating participants. An easier way to view this and other disparities between ratings are with pattern matches.

Pattern Matches

The ratings results were explored using two types of reports; Pattern Matches and Go-Zones. Pattern matches can contrast various participant sub-groups to illustrate how they each rate the clusters according to importance or feasibility criteria.

In the pattern matches, each line represents a separate cluster. A horizontal bar indicates relative agreement in ratings, whereas diagonal bars indicates a difference, and a steeper slope indicates more of a difference. The vertical bars represent the scales, which are specific to each group that is compared. The scale on the left vertical line extends the full scale of ratings from that group, and vice versa for the right side. These comparisons are therefore relative, in order to highlight differences between groups. In the following pattern matches, less important ratings are closer to the top of the vertical bar and more important ratings are closer to the bottom of the vertical bar.

As stated above, the demographic response rates limited the possible comparisons between some of the participant groups. Levels of response to each question are listed in Appendix N. Comparisons between the various geographic responses were consistent with the cluster rating map, in terms of cluster prioritization. Since the geographic variables did not reveal significant differences, maps were not produced

with that data.

The Institutional Affiliation and Role sub-group categories both revealed interesting findings, however. Figure 17 below compares the same participant groups as the two cluster rating maps above. The differences in ratings are readily apparent in a pattern match.

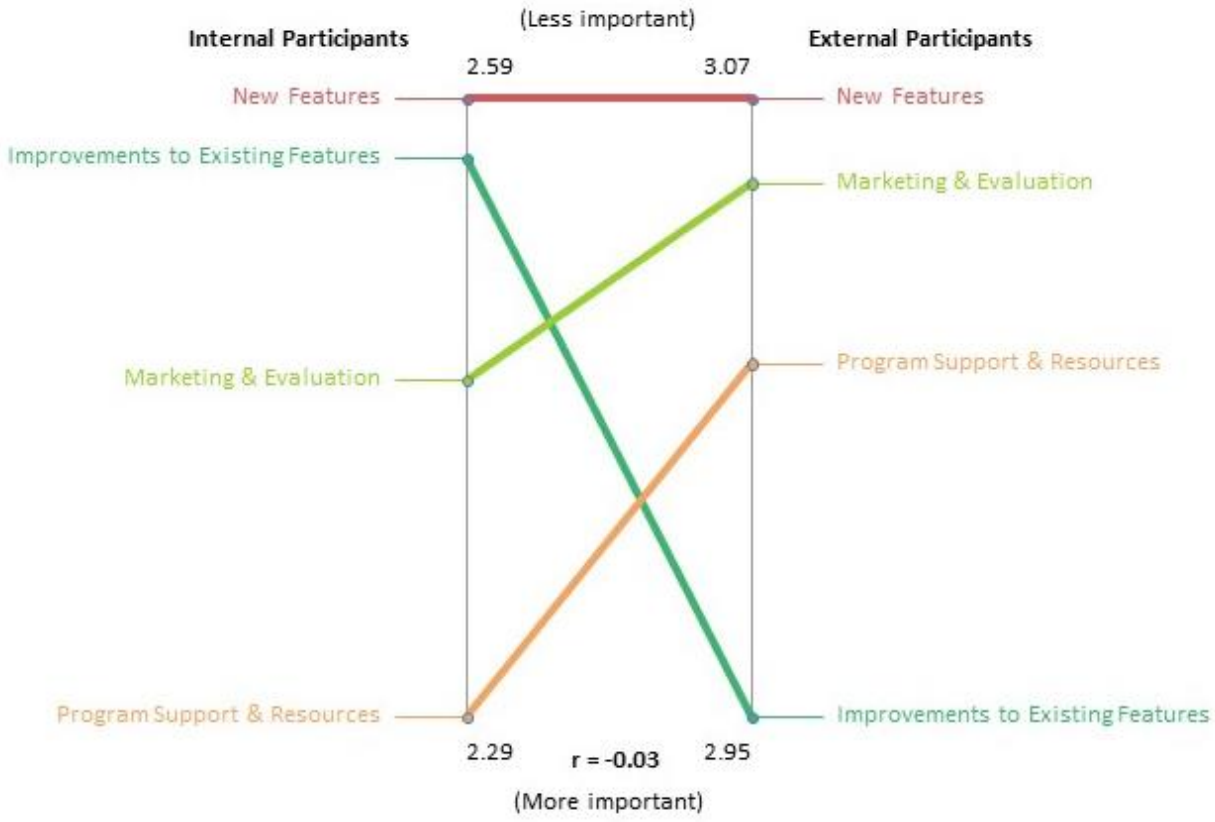


Figure 17. Pattern Match – Importance Rating, Internal vs External Participants

Here we can easily see that the largest difference of opinion between internal and external participants concerns the green diagonal line representing Improvements to Existing Features cluster. Internal participants rated these improvements as the second least important statements, whereas the external participants rated them as clearly the most important.

The pattern match below uses the exact same data but with matching rating scales, so the top and bottom of the vertical bars represent the same values on each side. While this is more accurate in terms of actual rating, it is not as easy to view the differences between the two groups. Regardless, the interpretation is the same. Subsequent pattern matches here use relative scales.

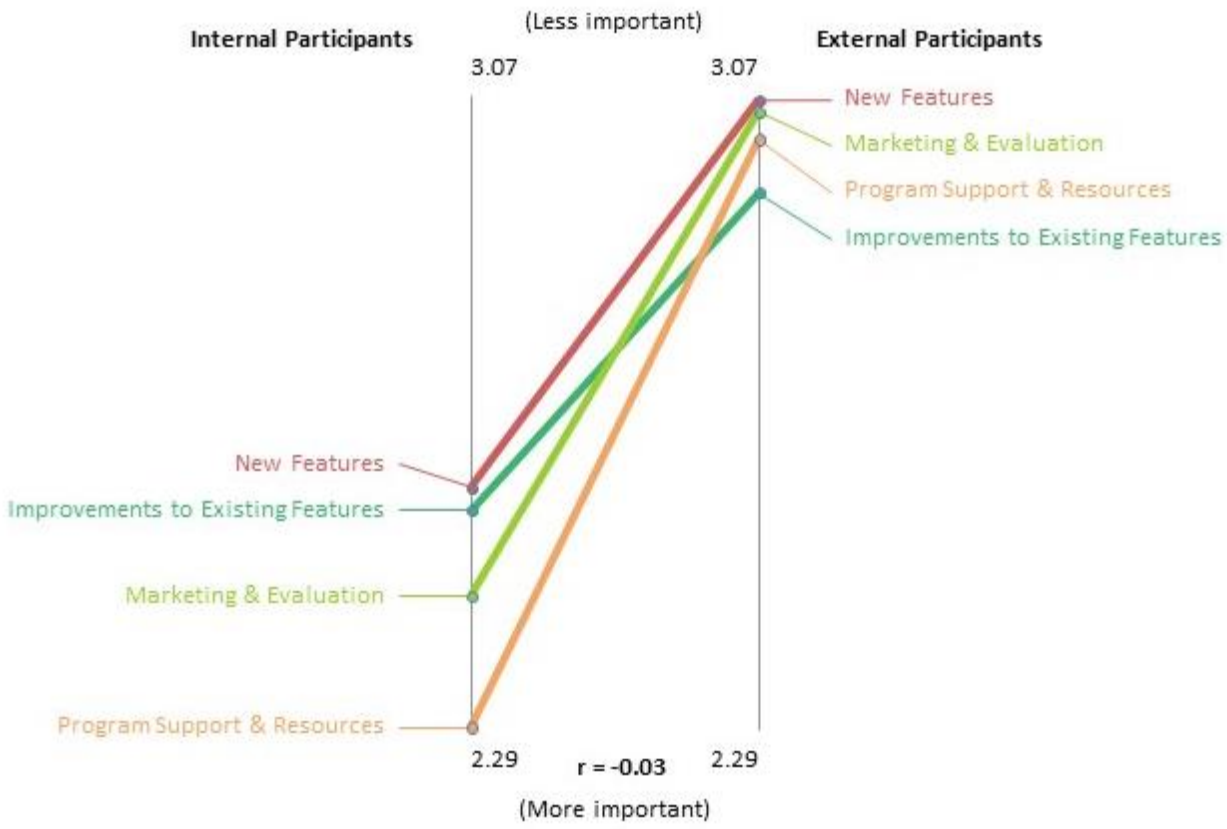


Figure 18. Pattern Match – Importance Rating, Internal vs External Participants (Matching Scales)

Perspectives of feasibility also contrast in similarly interesting ways. This comparison in Figure 19 below reveals very different perceptions of feasibility between participants associated with the end-use of the MarketMaker website and the decision makers who are managing it.

Participants associated with end-use include the Role of Outreach/Educator/Facilitator" and the Institutional Affiliation of For-profit

business (producer, processor, wholesaler, distributer, retailer), with a total of 9 (27.2%) raters. Decision makers in this comparison include the Roles of Policy Advisory Committee (PAC) and the Principal Investigators (PI), with 10 (30.3%) raters.

One way to interpret this map would be to say that decision makers view everything but the Improvements to Existing Features as feasible. The end users, on the other hand, view the New Features cluster as least feasible. Again, this seems to indicate that those making decisions about the site have a different perspective from those who use the site.

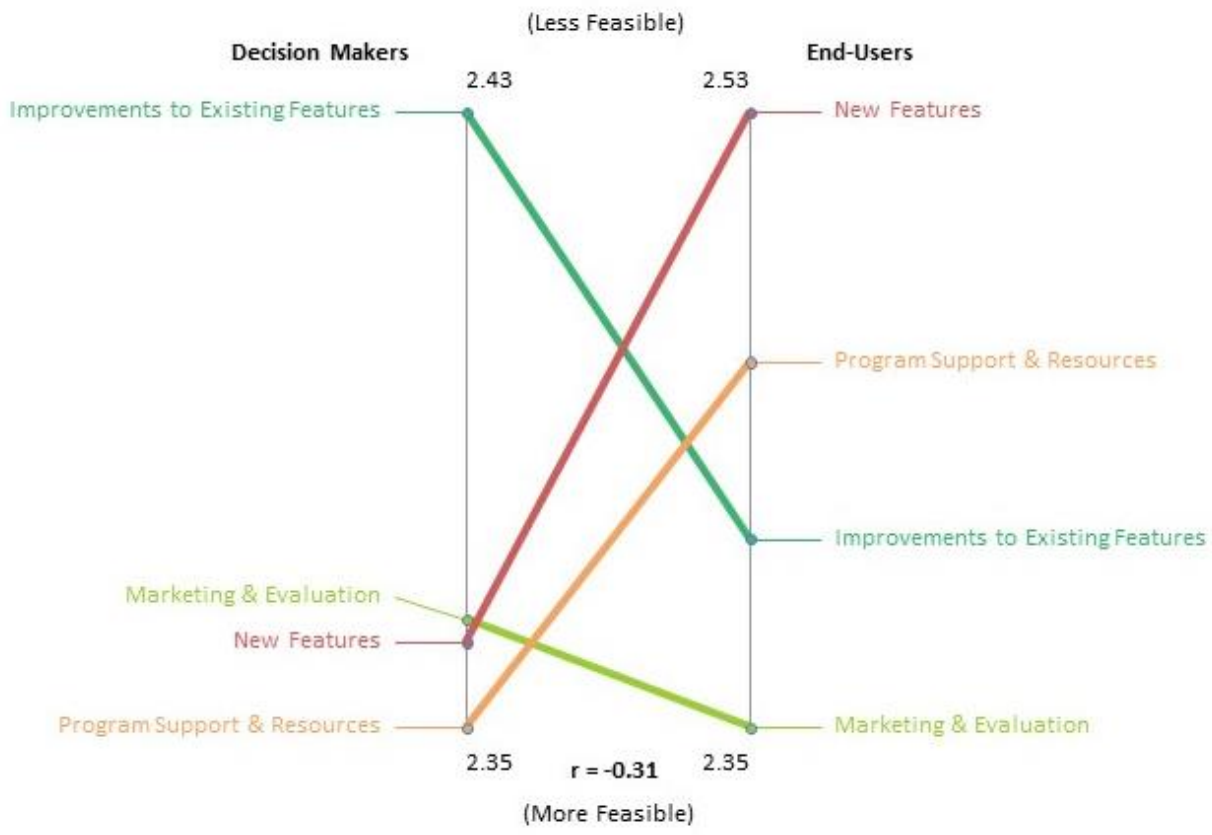


Figure 19. Pattern Match - Feasibility Rating, Decision Makers vs End Users

These contrasts can be seen in other comparisons, including importance by all raters and feasibility by decision makers shown in Figure 20 below. This pattern match is perhaps less intuitive because it compares different ratings, importance rating of one group versus feasibility rating of another group, but it may also be one of the most valuable.

New features, on average, appear to be least important for all raters, while decision makers think they are the most feasible. The reverse is true for the Program Support

& Resources cluster, where all raters felt these were the most important statements, while the decision makers felt they were the least feasible cluster.

The group of all importance raters includes 49 (100%) of importance raters and decision makers in this case includes the PAC, PIs, and the Tech Team with 12 (36.3%) of feasibility raters.

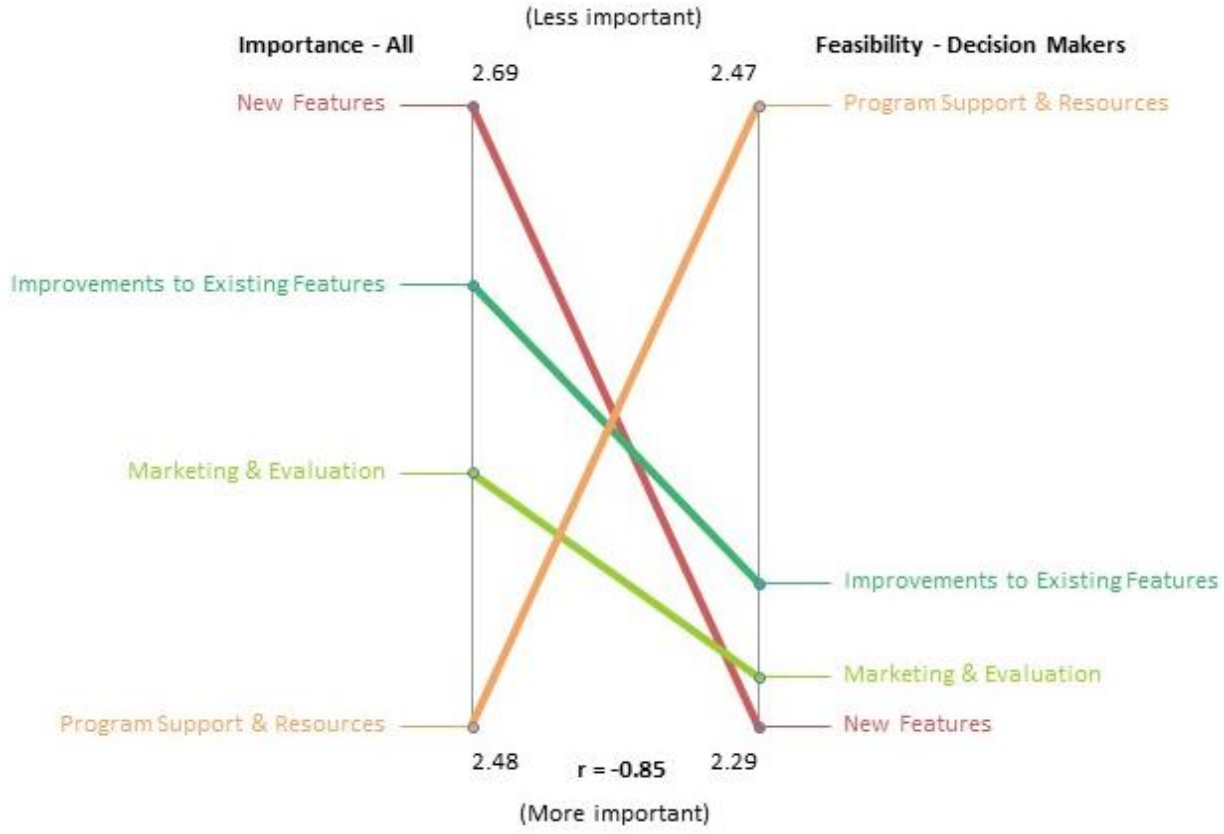


Figure 20. Pattern Match – Importance by All Raters vs Feasibility by Decision Makers

Go-Zones

Go-Zones allow us to compare statements according to the rating criteria with a graphical report. The resulting grid is divided into four quadrants defined by the mean value for each criterion. The top and bottom of the *Y*-axis, for example, represents the low and high end of the rating, with the dividing line representing the average rating. The quadrant with above average importance and feasibility, the lower-left quadrant in this case, can be seen as the highest priority items (i.e., above average in both importance and feasibility) and is termed the Go-Zone. Figure 21 below compares importance on the *X*-axis and feasibility on the *Y*-axis, according to all participants. Figure 22 is the same figure focused in on the Go-Zone.

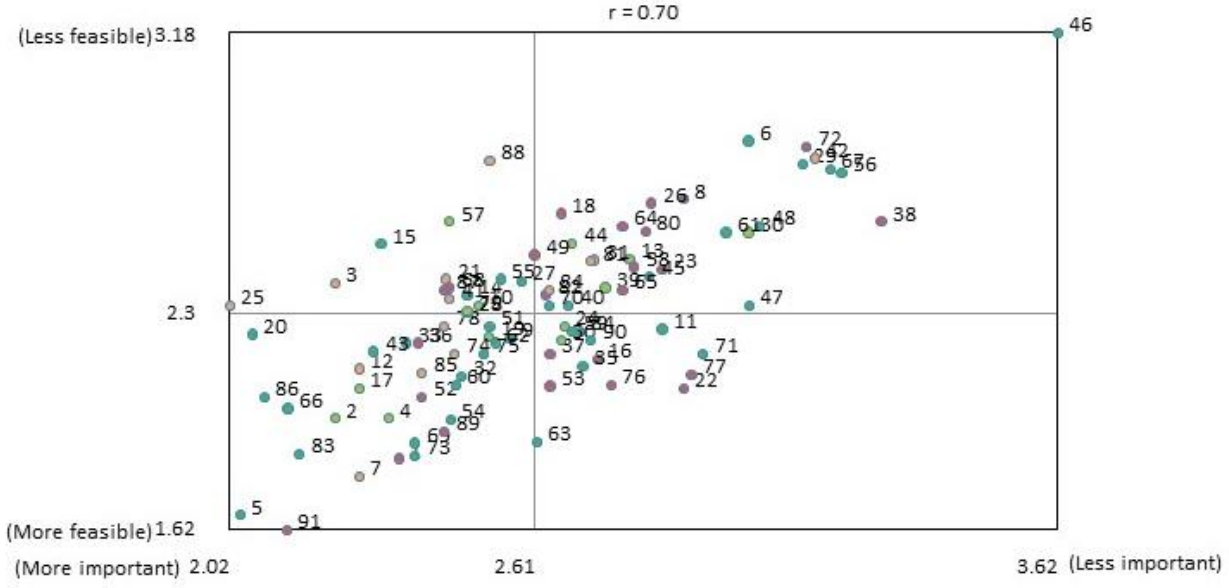


Figure 21. Go-Zone – Feasibility vs Importance by All Raters

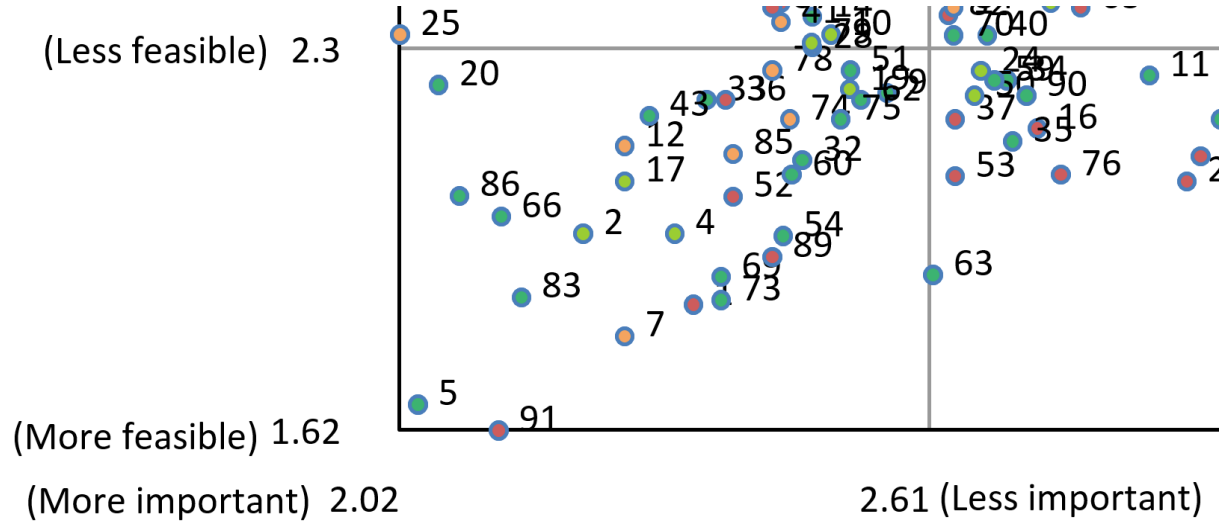


Figure 22. Go-Zone, Highest Priorities – Feasibility vs Importance by All Raters

The same analysis was then limited to the feasibility rating by decision makers, as in the last pattern match above. The results are presented in Figures 19 and 20 below. There is a strong overlap between the graphs.

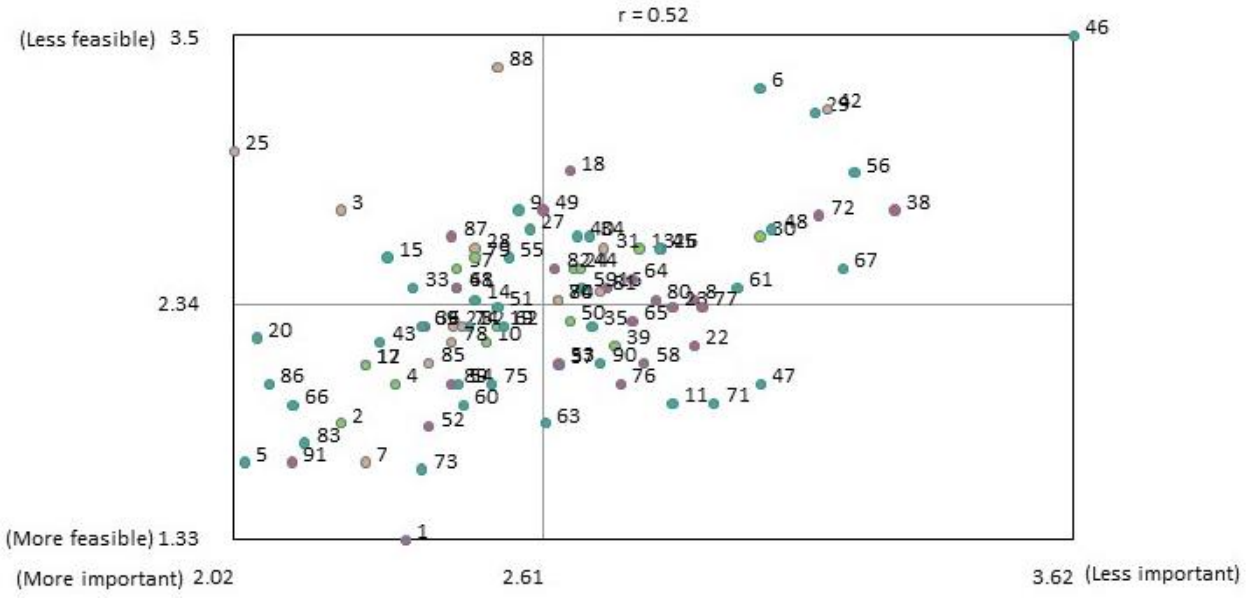


Figure 23. Go-Zone – Feasibility by Decision Makers vs Importance by All Raters

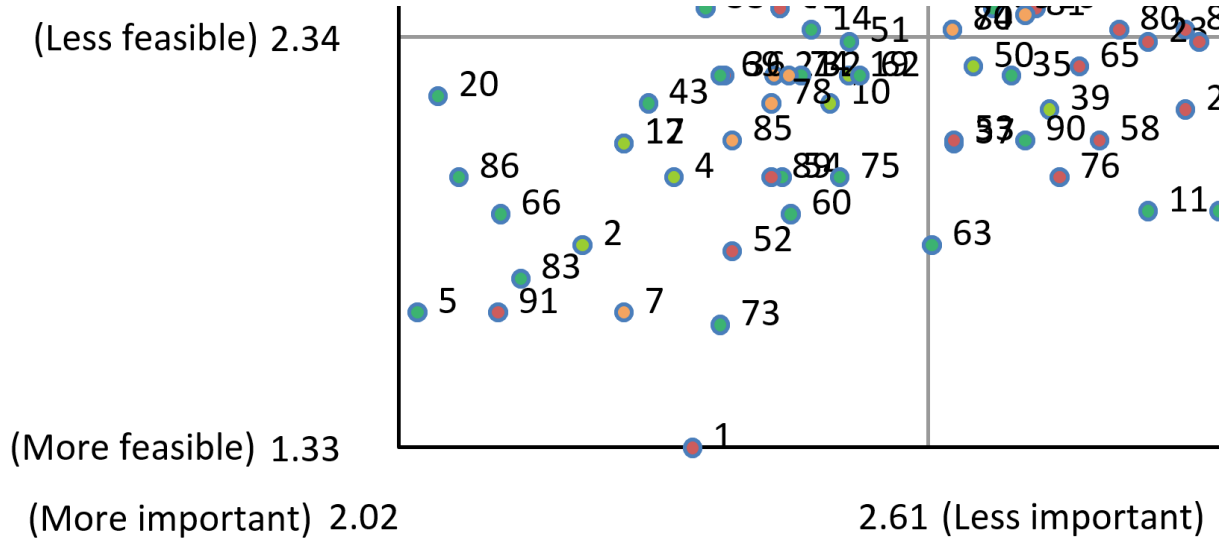


Figure 24. Go-Zone, Highest Priorities – Feasibility by Decision makers vs Importance by All Raters

A list of the statements included in the Go-Zone for all participants is included in Appendix O. The statements are listed in order of statement number, as opposed to feasibility or importance rating. To rank them in terms of priority, as a combination of importance and feasibility, would require a subjective assessment of priority of feasibility versus importance. There is an almost full overlap between the same statement list of all raters and decision makers, which indicates a reassuring agreement.

Utilization

The results of this study provided important information for the stakeholders, and for the participant sub-groups in particular. The point and cluster maps illustrated for participants how their feedback fits in the context of all of the participants, and Pattern Matches and Go-Zone reports help reveal where differences lie. The results were presented and discussed on multiple occasions with the project committee and other interested participants.

The study was accomplished in partnership with the Tech Team, so that early feedback could be provided and integrated into their workflow. By the time the study had completed, they had already accomplished many of the technology-related priorities. Some of the non-technology related priorities were far more difficult to

navigate and are ongoing projects.

Initial study results and interpretation of maps occurred at the annual MarketMaker stakeholder conference on October 13, 2015. One attendee commented that the presentation was the most valuable part of the conference. The final presentation was requested at the National Value-Added Agriculture annual conference on November 16, 2017, where a National Innovation Award was presented in recognition of the value the process and results provided.

Conclusion

This chapter presented the results of each phase of the concept mapping, as well as demographic and participation information about the participants. The next chapter summarizes these findings, including how they address the research question and potential implications.

CHAPTER 5: Discussion

Introduction

This chapter presents a summary of findings, including how the research results addressed the research question, several highlights and potential implications, and recommendations for further research.

Summary of Findings

The Research Question

The primary objective of this study was to generate and analyze data that could define stakeholder consensus regarding MarketMaker problems and opportunities, so that consensus-based decisions could be made about the continuing design and development of the website and program. The project committee settled on a single research question to address this, posed as a focus prompt: "One specific thing that would make MarketMaker valuable to me or my audiences is …"

This produced a comprehensive set of statements that represented the range of conceptual answers to the focus prompt. The 91 ideas submitted by the participants were refined and synthesized, and then sorted by the participants into groups. The hierarchical cluster analysis of the MDS coordinate space determined the final cluster maps, with the map of four clusters ultimately being selected. The four clusters

included Program Support & Resources, Marketing & Evaluation, Improvements to Existing Features, and New Features.

The four clusters were divided into two cluster groups, including statements and clusters that were program-related and those that were technology-related. The program-related group included the clusters Program Support & Resources and Marketing & Evaluation. The technology-related group included Improvements to Existing Features and New Features. The resulting maps from these processes serve as a representation of the stakeholder perspective about the website and program and will create a practical pipeline of projects with near and far term horizons.

Additional Analysis

Additional analyses of sub-groups from the same data revealed asymmetries that can help identify and communicate differences in priorities and expectations between stakeholders.

Technology Team Participation and Communication

After debate among the project committee about whether the focus prompt should be specific to the website or more general to include the broader program, it was interesting to see that 28 (30.8%) of the statements were in two of the four clusters that related to the program and not technology. Since the need for this study evolved

largely out of a desire to reconcile the differences and tensions created by the development of the Florida Food Connect website, I and others had an assumption that the results of the study would center around the MarketMaker website development.

There was initially resistance from the technology team about utilizing the concept mapping, or any process that might create more work for them, because they were already under pressure to address stakeholder frustrations by rapidly developing technological fixes, refinements, and new features. MarketMaker was one of multiple projects that some of them were responsible for, and they had in place a change management process for all projects. A new feedback process specific to MarketMaker might have seemed like unnecessary additional work, and a potentially threatening process to the one they already had in place.

After several discussions, it was understood that the results of the concept mapping project could dovetail into the development process they had in place without disrupting or challenging it. There was turnover in the technology leadership, however, and it seemed they were focused on more pressing issues which limited their continued engagement. Yet their participation was important for two reasons. Their feasibility rating was needed to fully evaluate the statements, at least the technology-

related ones, and their buy-in was needed to follow through and implement the ideas that would ultimately be prioritized.

There was some relief on their part that 37.4% of the statements were not directly related to technology, and some of those statements that were related to technology were already in progress. On the other hand, the tech team's limited participation meant that their perspective was limited in the analysis of the results. Some of the technology ideas that ended up in the Go Zone because they were rated highly for importance and feasibility may not actually be feasible from the tech team's perspective. Of the statements in the Go Zone, 21 (70%) are related to technology.

Stakeholder Sub-Group Comparisons

Without a formal communication process or decision-making methodology, priorities and expectations can easily exist without being communicated. Faulty assumptions may create unrealistic expectations about which things will get done and in what order, leading to frustration or lack of satisfaction. A participant or group might think an idea is important and feasible, for example, and therefore expect it to be accomplished quickly. The participant or group that is responsible for its implementation may think the idea is either not important or not feasible, or both, and choose not to implement it. Those differences could easily continue without

being expressed because neither group would have reason to think that their opinion is not shared among all participants.

Even with a formal methodology, these disconnects can be buried in the data. We saw in the results that perspectives among the participant sub-groups were dramatically different, but they were not evident in the initial analysis. The cluster rating maps of internal and external participants presented an interesting example. It was surprising to see that many of the statements were not directly related to technology, but the average participant ratings of statements differed between internal and external participants.

On average, the participants rated program-related statements as more important, yet a smaller group of external participants rated program-related statements as less important than the development of existing features. External participants in this case represented just 20% (10 of 49) of participants who rated importance, so their conflicting perspective was not visible in the initial analysis. They represent an unknown and presumably far higher percentage of MarketMaker users, however, so this likely has important implications. It was a limited result though, so it warrants further research with a larger population.

Another example is the asymmetry between the importance rating by all participants and the feasibility rating by decision makers. All users, on average, rated Program Support & Resources as the most important cluster, but decision makers rated it as the least feasible. It would clearly be important to discuss these differences among the various sub-groups to avoid unrealistic expectations that might otherwise lead to frustration.

Pattern matches clearly illustrated asymmetries that were not as visible otherwise. Pattern matches have the ability to equalize the input from stakeholders regardless of the size or influence of the group or the volume of the voice. This can avert communication issues between groups and subsequent problems that may result. Similarly, Go-Zones can compare two ratings for all participants or sub-groups. The Go-Zones that were produced identified the statements with the highest importance and the highest feasibility. These statements can be thought of as the lowest hanging fruit.

Stakeholders as a Unified Group

Since the focus of this study was to develop consensus among the stakeholders, with an emphasis on internal stakeholders who were involved in the site's development, the focus of the analysis was similarly on the analysis of the full group. The MarketMaker leaders were looking to support the development of a single website with functionality

that addressed the largest possible group, rather than contributing to more splintering. Nevertheless, it can be helpful to see where pockets of consensus and differences lie.

Beyond the identification of ideas, one of the most valuable aspects of the concept mapping methodology may be that the participants get to know themselves better as a group. The maps and reports can help the participants gain a better understanding of other participants' ideas, priorities, and to some extent, their demographic diversity. It also allows them to see their own perspective in relation to the full group, develop more realistic expectations, and reduce frustration.

These aspects were especially important for the MarketMaker group because they rarely see each other in person and different employment sectors or disciplines might otherwise create barriers. This was particularly true for the relationship between the full participant group and the tech team, and the concept mapping was able to improve their communication and mutual understanding.

It was hoped that the rift between the MarketMaker and FFC websites would get resolved as an outcome of the research. Since the FFC project was undertaken with only an implementation grant and without any long-term funding or plan for sustainability, the effort eventually ran out of funding and enthusiasm and the immediate problem went away with it. With such a small user base in the original

Florida MarketMaker website, and competing uses for the funds, the University of Florida pulled out of the MarketMaker project altogether. The underlying issues for the national MarketMaker remained, however, so the value of the research was not diminished.

Recommendations

MarketMaker

MarketMaker leaders should be commended for not only inviting and supporting the research, but also for making it as wide-reaching and inclusive as possible. This research was initiated from an internal and inward-looking perspective, but it developed early on into a more comprehensive inquiry by both broadening the focus prompt to include ideas beyond the website itself and to include external participants.

One of the most important findings from the research may be the differences between the participant sub-groups, particularly between internal and external participants. Several of the pattern matches discussed in Chapter 4 seemed to indicate that those making decisions about the site have a different perspective from those who use the site. This is understandable given that MarketMaker has such a broad set of features with different user groups that have expanded since its beginning.

This site emerged from an academic, research, and non-profit perspective, and its funding continues to come from these sources. One of the benefits the site offers is that is free to the end user. There is no membership fee or advertising. But that also means that there is not a direct revenue stream tied to private sector end users, which can allow the site to survive in the short term with low external participation. In the long term, the perspective of the end user needs to be addressed adequately, with input and metrics that are directly related to their engagement and satisfaction.

In this research, there was some overlap between the internal participants and end users, meaning that there is not always an entirely clear distinction between the groups. Participants affiliated with private businesses were the only ones who are strictly external. They represented a minority perspective among the participants, but presumably a majority among the end-users and stakeholders. We had just enough external participants to reveal some of the disconnects, so a similar study with a larger population should be more revealing. External stakeholders could also be included on the recurring conference calls to regularly receive their input.

Resolution of Reversed Scale

The reversed Likert response format does not appear to have affected the data produced by the participants, but it did affect the appearance of the final maps by making them less intuitive to understand. I addressed this by labeling the axes with

higher and lower ratings in addition to the numerical labels. A better solution might have been to either reverse the scales of the individual ratings, either manually in CSGM or exporting the data and subtracting all ratings from 6.

A Directed Sort

During the statement sorting in the traditional concept mapping process, participants group the statements according to how they think they are related. No guidance is provided about how they should be sorted, except to sort every statement into one pile and to avoid a pile of unsorted or "miscellaneous" statements. The process otherwise leaves entirely to the subjective judgement of the participant how the sort is conducted.

On one hand, this can create a rich multidimensional map that can spur discussion and a deeper understanding of the issue being addressed and of the stakeholder group. Since this is an individual activity, different participants inevitably sort according to different criteria. In fact, they may use different criteria within their own sorting. For the resulting cluster map, there could be infinite number of criteria that define each cluster.

One of the challenges with the traditional concept mapping process is the transition to the utilization phase. This occurred this with this study, where the tech team was

initially resistant about how the process would work with their existing practice. It would be possible, however, to have participants sort the statements according to a specific criterion. The use of inclusion rules could serve to make the results less focused on conceptual meaning and more focused on decision-making to facilitate the transition to the utilization phase.

Criteria that determine where an item will be sorted are analogous to inclusion rules, in the development of a taxonomy, for example (Smith, 2002). Stemler refers to these criteria as "a priori coding" since they are determined in advance, as opposed to "emergent coding" in an unstructured sort (2001). What I propose is slightly different because I would define the criteria upon which participants sort, but the number of piles and their names would be up to the participants.

For a sort on a topic of technology development, for example, the criteria options could be related to technical, financial, maintenance, training, or evaluation. A very practical criterium might be to sort each statement according to who the responsible party is for implementing it. The statements in a given cluster could then be rated according to feasibility by the group named for that cluster.

A criterion for a website design project could be where each idea should be on the website, either by sections or layers of a website. Participants might sort statements

into a pile for the homepage, secondary, or tertiary pages. Stages of development or seasonality are yet other possible criteria. This directed sort could be done in lieu of or in addition to the traditional concept mapping sort. The process could involve multiple sorts, beginning with the traditional conceptual sort and followed by one or more directed sort.

It is possible that the same information could be gleaned from a rating format, configured in a variety of ways. The same criterion listed above could be used as a rating question in addition to the importance and feasibility ratings. With a cluster map as the final product, each statement could be rated with a binary value for each possible a priori cluster to determine if it fit in a given category.

An advantage of this approach is that participants could choose more than one category, and the average value for each statement would be calculated to determine in which cluster it belonged. A disadvantage of a rating is that it would require that the categories be determined ahead of time. Prior specification could be cumbersome if there were many clusters, but more importantly, it could miss the opportunity to identify new categories.

A sort would allow people to create their own categories, which may represent unique or new categories that do not otherwise exist. The disadvantage is that HCA, with its

non-overlapping clusters, would place the statement in one cluster and would not show a shared relationship. On the other hand, participants could identify piles of shared belonging, as they currently do with an unstructured sort. This kind of shared relationship could also be represented with an overlay of a group of clusters, as the clusters in this study were grouped into program-related and technology-related clusters. Finally, a bridging analysis could reveal the relationship of each point to the rest of the cluster map.

Alternatively, an emergent sort could be done so that the participants determine the piles, but then that sort data could be transmuted into binary data. One dummy variable would be created for each pile across all participants, in effect creating a rating. This might require inferences about what participants mean by their pile names, but that is the case with the traditional sort as well.

A directed sort could potentially be seen as diminishing the participant's perspective, since the criterion would be determined in advance, but that does not need to be the case. The methodology could still begin with the traditional conceptual sort, and the criterion does not need to be determined by the researcher or other external party. The sorting criteria could be developed by the stakeholders themselves, perhaps with a separate concept mapping project.

The results from consistent sorting criteria and of a potentially improved transition to the utilization phase make a directed sort worthy of further exploration as a variation to the traditional concept mapping process. It may not be a difficult addition to a traditional concept mapping process and could be explored as a follow up phase that would not otherwise affect the results.

Idea Development

An advantage of the CSGM application is that is allows unimpeded, anonymous idea submission. A central tenant of brainstorming is that all ideas are valid, and the concept mapping methodology minimizes some potential problems with group dynamics. Once the idea generation phase is completed, the researcher refines the ideas into a final statement set before providing them back to the participant group for structuring.

In the case of this research, it seems an opportunity might have been missed for the participants to vet, refine, and improve the statement set through constructive conflict. Diehl and Stroebe state that brainstorming, like listening sessions, focus groups, and surveys are all one-way methods of generating ideas. They suggest that the quality of the ideas could be improved by developing ideas as individuals and then developing them together through discussion and dialog (1987).

While there is idea evolution and refinement in concept mapping, Seibold emphasizes the importance of participant interaction (Seibold, 1996). There are several approaches in the literature. Janis emphasizes the importance of "critical evaluators" who can point out the potential disadvantages of proposed solutions or decisions (Janis, 1972). The techniques of devil's advocacy and dialectical inquiry are both found to result in better decisions (Dean & Sharfman, 1996; Schwenk, 1988, 1990), although there is some debate (Schweiger, Sandberg, & Ragan, 1986).

While conflict like this can lead to a negative and unconstructive group dynamic (De Dreu, Harinck, & Van Vianen, 1999), Nemeth, et al. point out that this can happen in a positive group setting, where ideas are improved with answers and clarifications to questions, adding critical information, or providing multiple versions of the same idea to provide a choice of options. They write that "… dissent, debate and competing views have positive value, stimulating divergent and creative thought" (Nemeth, Personnaz, Personnaz, & Goncalo, 2004).

Morris and Warman reinforce this when they write "By grafting on to ideas and transforming ideas from different sources to fit our context, we get the best solutions. Rare is the transformative idea that emerges fully formed from one person or one source" and that "… 'bad' ideas often give rise to good ideas when they juxtaposed with other ideas and new options arise from grafting and modifying them" (2015).

In their theory of group decision-making, Hirokawa and Johnson state that group decision-making is characterized as an evolutionary process resulting from "continual clarification, refutation, substantiation, extension, modification, and synthesis of a number of ideas and perceptions introduced by group members" (1989). Likewise, Hirokawa's research identifies the generation and awareness of alternative solutions as a requisite function in group decision-making theory (1985, 1988). In particular, Orlitzky, et al. find that an evaluation of negative consequences of alternative ideas is the most important factor in decision-making effectiveness (2001).

It is possible that the brainstormed statements could continue to be developed anonymously if the technology permitted it and if there were enough time available in the process. Clarifying questions could be asked and answered, as with a online discussion board, and participants could request more information about individual statements. Participants could be encouraged to propose variations on an idea, as possible alternative options. Multiple versions of an idea could then be rated.

Idea development could also take place later in the concept mapping process or as a subsequent process to further develop ideas that are identified as key statements with high importance and feasibility. There is a risk that a key idea might be filtered out in the concept mapping process, with low importance or feasibility rating, only because

the idea was not worded well, or was not fully developed. Participants who rate might not understand the statement as it could be if it were fully developed. While structured conflict could improve the quality of decision-making, its benefits would need to be balanced with the efficiency, convenience, and perhaps the anonymity of the online platform in CSGM.

Conclusion

This chapter summarized the findings from the research and presented several recommendations for future work. A discussion of how the research question was answered as well as additional analyses on participant sub-groups were covered. The primary objective of this study was to generate and analyze data that could define stakeholder consensus regarding MarketMaker problems and opportunities, so that consensus-based decisions could be made about the continuing design and development of the website and program.

A comprehensive set of conceptual responses was gathered and analyzed, producing a list of priority items the participant group could use to discuss and make decisions. Several conflicting perspectives were also revealed, providing valuable insight. In summary, the participants currently making decisions about the development of the MarketMaker website seem to be most interested in new directions and opportunities, while the end users are most interested in the current status of the existing site.

Aligning those perspectives should be a top priority, and this could be accomplished by engaging external users in the development of the website and including a larger population in a similar study.

The findings are consistent with the decision-making approaches discussed in the literature review. Several of the approaches emerged out of a need to connect decision making to the end-user. Among others, professionals in business analysis, design, and sales have all developed a strong emphasis on the end user's perspective in developing solutions. This seems in reaction to the natural tendency for a solution's development to either start from an external perspective and struggle to address the core issue, or for the solution to drift from the initial definition.

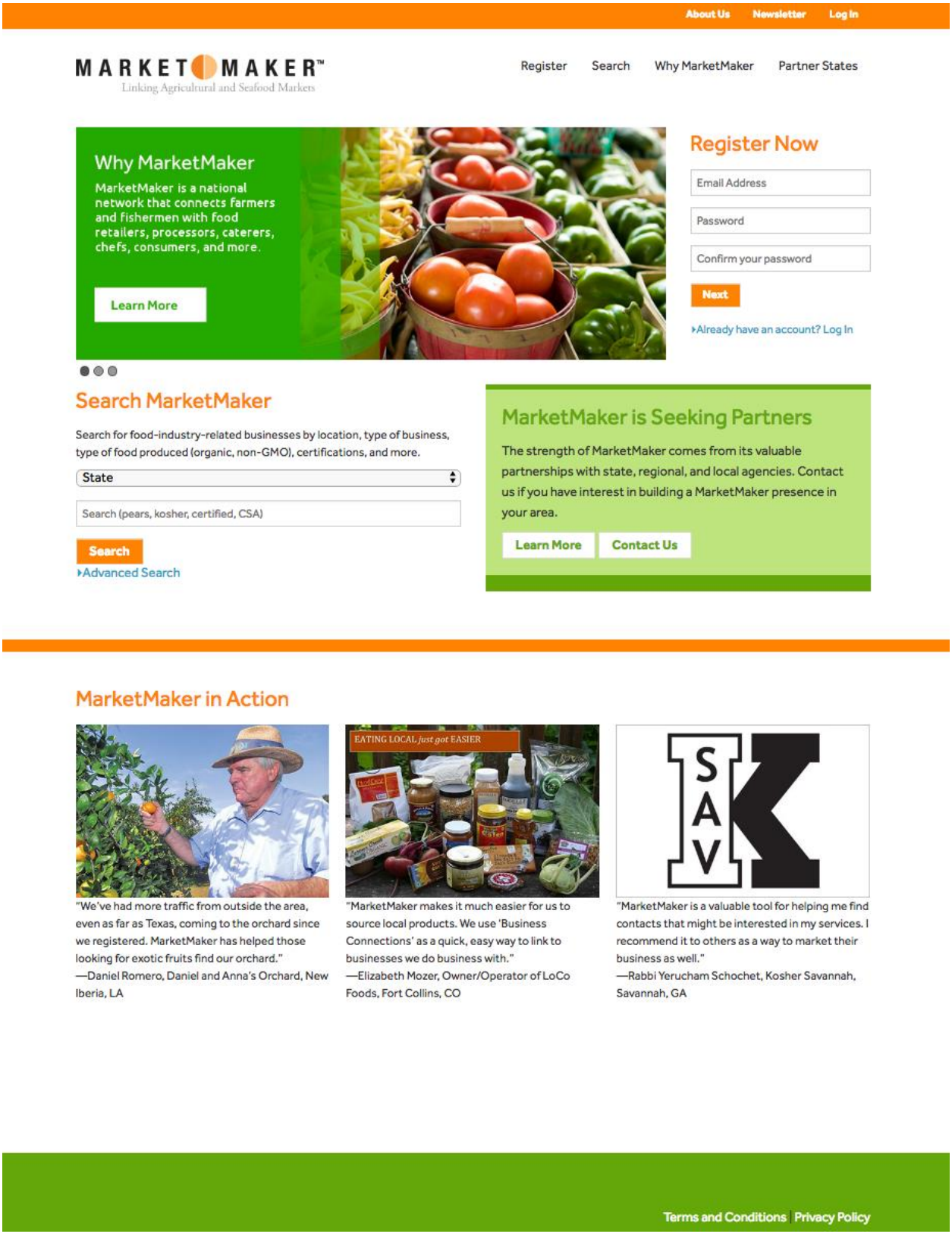
While the results of this study are specific to the topic of the MarketMaker website, the conclusions are generalizable to similar situations. Technology-related projects are increasingly frequent in organizations, whether they be the development of a website, cloud strategies, or digital transformations (Grajek & Grama, 2018). This means that decisions concerning technology solutions will become increasingly frequent, and a methodology to proactively handle the challenges is valuable.

A data-driven methodology such as concept mapping has many advantages in these instances. It is a very adaptable methodology that lends itself well to new topics and

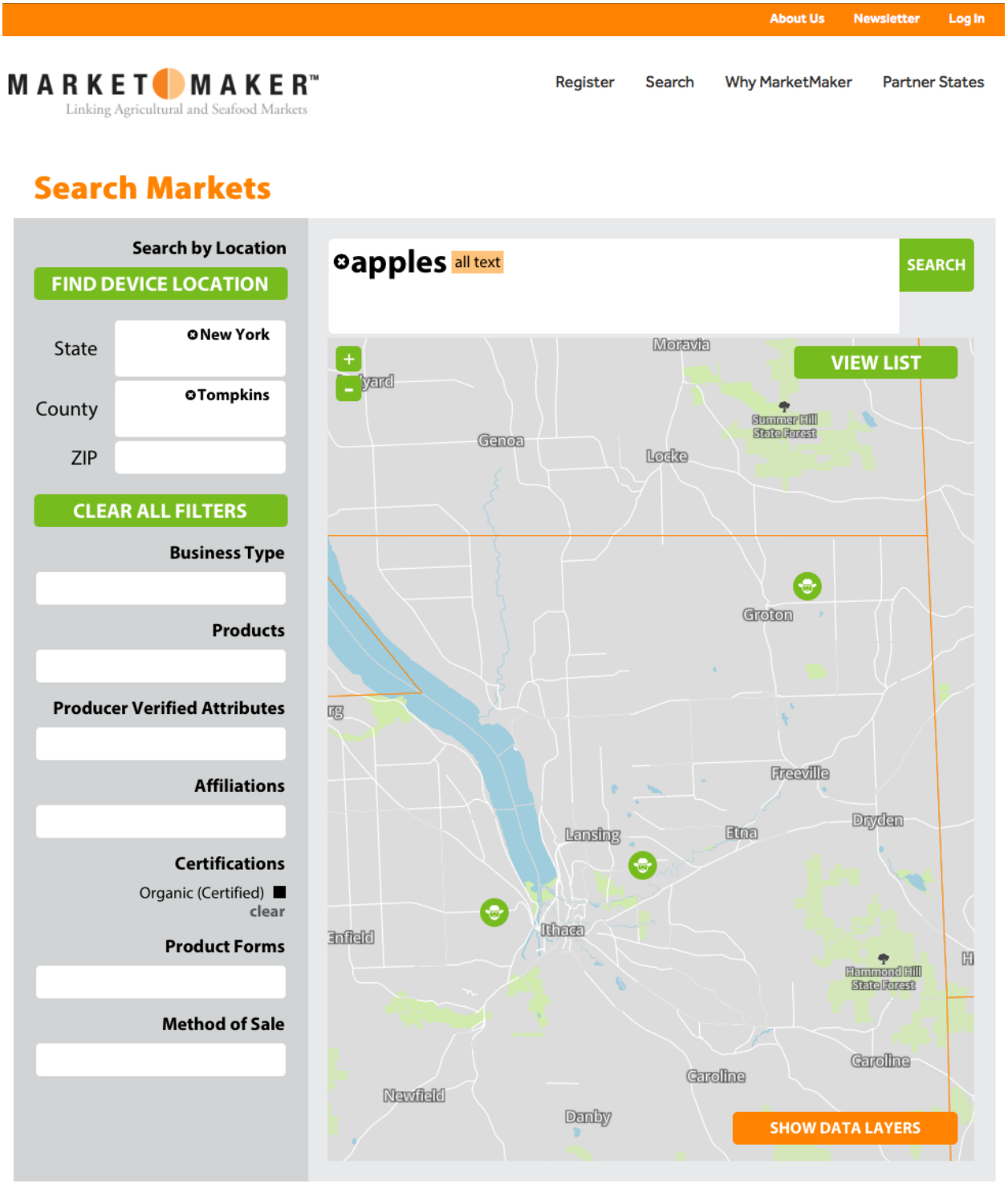
disciplines. It satisfied several of the tenants of the functional decision-making theory by defining the question through the focus prompt and then generating and refining a set of acceptable solutions from which the participants can choose. It is a promising method for this kind of complex problem and further research and refinement would be worthwhile.

Two recommendations related to the methodology included possible variations on the traditional concept mapping process. One is a directed sort, where an a priori criterion is determined for the sort, potentially providing a more focused and practical result for the subsequent phase of utilization. The other is to develop the generated ideas through participant interaction, potentially resulting in ideas that are more thoroughly expressed and better understood. A larger population of external users and an exploration of the two methodological variations would be the major changes for a subsequent study.

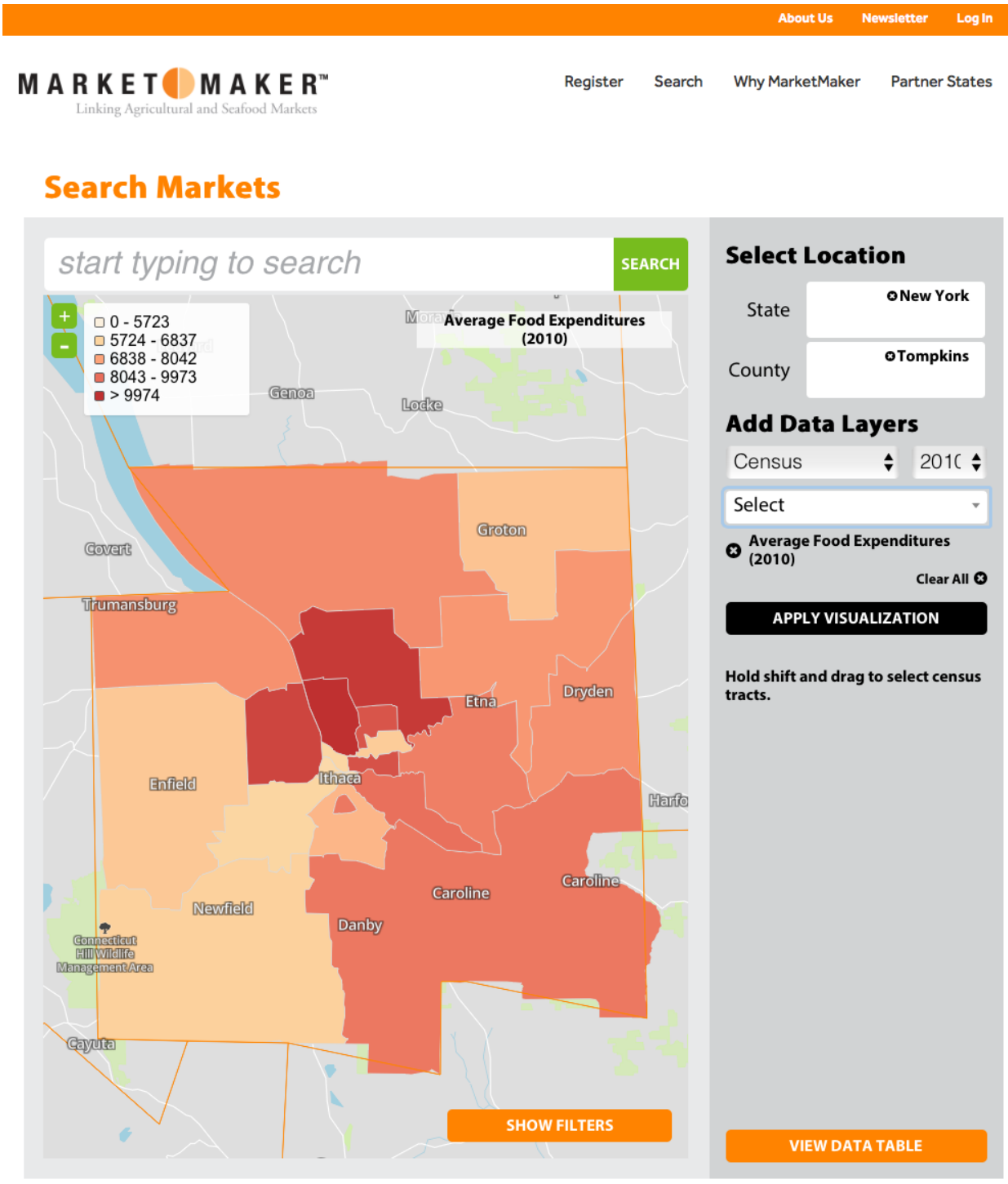
Appendix A. An Image of the MarketMaker Homepage



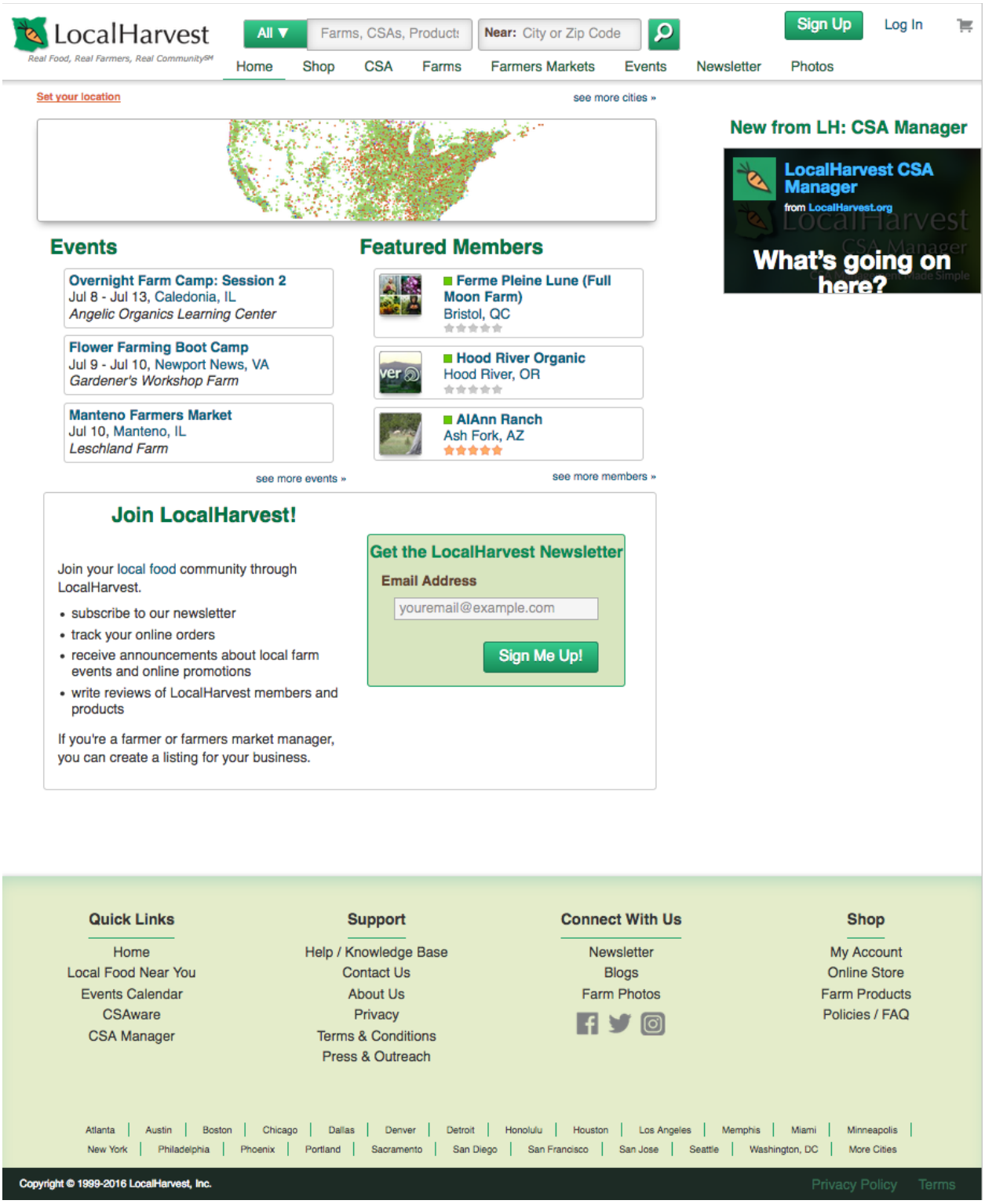
Appendix B. A MarketMaker Search for Organic Apples for Sale



Appendix C. An Example of MarketMaker Market Research



Appendix D. An Image of the Local Harvest Homepage



Appendix E. An Image of the Florida Food Connect Homepage

Appendix F. CSGM Rating Form

Please rate the importance of each statement from your perspective.

Project Focus Prompt: One specific thing that would make MarketMaker valuable to me or my audiences is ...

○ Show unrated statements only ◉ Show all statements

Statement	Rating: Very Important								Not Important
tracking of hits on each farmers' site so that the value of the service can be determined [unrate]	○ 1	○ 2	○ 3	○ 4	◉ 5
to develop and deliver educational workshops for local businesses and farmers, to ensure they know about MM and its value [unrate]	○ 1	○ 2	○ 3	◉ 4	○ 5
financial support to maintain, promote, and utilize the program in Extension activities [unrate]	○ 1	○ 2	◉ 3	○ 4	○ 5
expanding marketing opportunities and recognitions for businesses in a region or at national level [unrate]	○ 1	○ 2	◉ 3	○ 4	○ 5
to make the site navigation easier and more focused [unrate]	○ 1	◉ 2	○ 3	○ 4	○ 5
being part of a state wide Enterprise Resource Planning (ERP) tool with a Point of Sale (POS) [unrate]	○ 1	◉ 2	○ 3	○ 4	○ 5
to provide MM representatives impact data to prove to Administration that MarketMaker is having an economic impact in the states we serve [unrate]	○ 1	○ 2	○ 3	◉ 4	○ 5
more capacity developed for use in the classroom [unrate]	○ 1	◉ 2	○ 3	○ 4	○ 5
the inclusion of all agriculture, forestry, fishing, fishfarming related economic sectors [unrate]	○ 1	○ 2	○ 3	○ 4	◉ 5
to conduct focus groups with producers and buyers to help identify adoption roadblocks [unrate]	○ 1	○ 2	◉ 3	○ 4	○ 5
including the state branded logo in the search results and not just posted within the individual profile [unrate]	◉ 1	○ 2	○ 3	○ 4	○ 5
improved collaboration and "buy in" from core partners [unrate]	◉ 1	○ 2	○ 3	○ 4	○ 5
to conduct more research concerning how farmers communicate (i.e., are farmers typically willing to use this medium?) [unrate]	◉ 1	○ 2	○ 3	○ 4	○ 5
meaningful integration of other data (e.g., USDA newly-released directories, OrangePippin.com) [unrate]	○ 1	◉ 2	○ 3	○ 4	○ 5
adequate staff resources to fully take advantage of technology [unrate]	○ 1	◉ 2	○ 3	○ 4	○ 5
to help us clean up old data [unrate]	○ 1	○ 2	○ 3	◉ 4	○ 5
to implement evaluation processes to ensure the site remains relevant [unrate]	○ 1	○ 2	○ 3	○ 4	◉ 5
easier access to wholesale prices [unrate]	○ 1	○ 2	◉ 3	○ 4	○ 5
to provide advertising materials to help us market MM (e.g., banners, displays, table covers, flyers, pens) [unrate]	○ 1	◉ 2	○ 3	○ 4	○ 5
for MM to show up on first page of Google search results for keywords (e.g., fresh, local, organic, market) [unrate]	○ 1	○ 2	○ 3	◉ 4	○ 5
a franchise model to help states understand how MM can be used, what to expect in terms of costs and benefits, metrics to monitor [unrate]	○ 1	○ 2	○ 3	○ 4	◉ 5
to include a seasonality chart [unrate]	○ 1	○ 2	◉ 3	○ 4	○ 5
being a repository of case studies, success stories, and research related to MM (e.g., food hubs, econ dev) [unrate]	○ 1	○ 2	◉ 3	○ 4	○ 5
promoting more locally grown foods becoming commercially available in major grocery store chains [unrate]	○ 1	○ 2	◉ 3	○ 4	○ 5
to keep MarketMaker free [unrate]	◉ 1	○ 2	○ 3	○ 4	○ 5
promoting cottage foods enterprises [unrate]	○ 1	◉ 2	○ 3	○ 4	○ 5
clearer info from producers (e.g., volume capacity, product availability in terms of pounds, dates available, shipping or distribution options) [unrate]	○ 1	○ 2	○ 3	◉ 4	○ 5
clearer communication of the long-term goals of the program (e.g., international purchasing capability of registered buyers) [unrate]	○ 1	○ 2	○ 3	◉ 4	○ 5
to be more regionally focused (i.e., statewide is too large) [unrate]	○ 1	◉ 2	○ 3	○ 4	○ 5
to have updated blogs and other market announcements, at least on a weekly basis [unrate]	○ 1	◉ 2	○ 3	○ 4	○ 5
to change the name to something attractive to farmers and people in food industry, so that people can relate it to agriculture or food industry [unrate]	◉ 1	○ 2	○ 3	○ 4	○ 5
to have product categories that are more relevant, specific, and concise (e.g., free range eggs), but also with definitions in a hover box or glossary [unrate]	○ 1	○ 2	◉ 3	○ 4	○ 5
to include categories of foodshed infrastructure (e.g., certified kitchens, post-harvest handling & processing facilities, food distribution resources, land) [unrate]	○ 1	○ 2	◉ 3	○ 4	○ 5
to integrate with USDA 'Know Your Farmer, Know Your Food' program/website [unrate]	○ 1	○ 2	○ 3	◉ 4	○ 5
a food bank connection program (e.g., the "donate to a food bank" option in Georgia) [unrate]	○ 1	○ 2	○ 3	◉ 4	○ 5
to have a consumer orientation in addition to a producer/buyer orientation (i.e., the consumer site needs to be easier to use than the producer/buyer site) [unrate]	○ 1	○ 2	◉ 3	○ 4	○ 5
to keep users engaged with email alerts regarding new registrations, listings, or other activities from businesses in their local areas [unrate]	○ 1	○ 2	○ 3	◉ 4	○ 5
making GAP certified more of a focus on viewed profiles to get the general public thinking about food safety [unrate]	○ 1	○ 2	◉ 3	○ 4	○ 5
sharing testimonials of impacts for representative stakeholders [unrate]	○ 1	◉ 2	○ 3	○ 4	○ 5
a way to better serve specific products categories in more detail (e.g., fruit, meats, vegetables, value added, artisal, fish, forestry products, livestock, non-food) [unrate]	○ 1	○ 2	○ 3	◉ 4	○ 5
a well-understood, consensus-based, plan for moving forward with clearly-defined roles for all [unrate]	○ 1	○ 2	○ 3	○ 4	◉ 5
to sell advertising space [unrate]	◉ 1	○ 2	○ 3	○ 4	○ 5

Appendix G. Brainstorming Invitation

From: Bryan Dailey <bwd2@cornell.edu>
Date: Friday, October 3, 2014 12:18 PM
Subject: MarketMaker Concept Mapping

Hello,
In conversations about the development of MarketMaker, the importance and challenge of feedback is frequently raised. You are invited to participate in a process called Concept Mapping, being conducted with the MarketMaker evaluation committee. It will help find consensus on priorities and provide a framework for planning, implementation, and evaluation.

The process starts with brainstorming at the link below until October 25th. You can participate in as little as three minutes. Please pass this link on to other MarketMaker users. Information about processing the responses will follow.
Thank you,
Bryan

http://conceptsystemsglobal.com/MarketMaker/brainstorm

Bryan Dailey
Sarasota County Extension Director
University of Florida / IFAS
bdailey@ufl.edu
941-861-9808

Appendix H. The First 30 Data Points of the Combined Group Similarity Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1		3	2	2	6	2	12	3	3	5	7	1	8	6	3	10	13	5	4	9	6	9	7	3	2	3	6	3	3	4
2	3		3	4	0	1	5	14	2	8	0	5	6	1	3	2	4	1	8	3	6	1	4	4	3	4	1	3	1	9
3	2	3		2	0	7	7	0	2	2	3	13	2	5	16	3	6	0	5	3	15	0	2	1	21	0	0	12	3	2
4	2	4	2		1	3	5	4	4	10	4	4	7	4	1	2	4	4	12	7	4	1	3	10	4	10	0	7	4	12
5	6	0	0	1		7	1	4	6	1	14	1	0	8	5	13	1	10	0	11	0	15	3	1	1	1	15	0	7	4
6	2	1	7	3	7		5	4	7	0	7	5	1	10	9	5	8	7	1	7	9	6	2	1	6	3	5	7	8	3
7	12	5	7	5	1	5		5	3	11	3	8	8	4	8	5	18	0	8	4	14	2	8	2	10	1	1	9	3	7
8	3	14	0	4	4	4	5		5	9	2	5	5	2	2	0	1	3	6	3	4	6	9	5	4	7	5	2	9	8
9	3	2	2	4	6	7	3	5		1	9	6	0	9	5	5	4	11	0	7	2	9	3	5	5	8	10	4	10	1
10	5	8	2	10	1	0	11	9	1		0	7	14	1	1	3	8	2	13	2	8	3	9	3	2	5	2	4	5	9
11	7	0	3	4	14	7	3	2	9	0		5	1	7	4	10	2	10	4	12	2	15	5	6	5	6	12	3	6	4
12	1	5	13	4	1	5	8	5	6	7	5		1	6	12	5	6	3	8	5	13	1	5	5	16	3	2	12	10	3
13	8	6	2	7	0	1	8	5	0	14	1	1		7	1	3	14	1	4	1	6	1	10	1	2	4	1	4	1	3
14	6	1	5	4	8	10	4	2	9	1	7	6	7		6	10	9	9	0	9	4	6	5	1	7	2	6	5	5	4
15	3	3	16	1	5	9	8	2	5	1	4	12	1	6		8	7	1	4	7	11	2	2	3	18	2	2	11	9	2
16	10	2	3	2	13	5	5	0	5	3	10	5	3	10	8		9	7	2	12	5	10	5	3	4	2	9	3	5	2
17	13	4	6	4	1	8	18	1	4	8	2	6	14	9	7	9		1	2	6	11	1	6	0	7	0	0	8	2	3
18	5	1	0	4	10	7	0	3	11	2	10	3	1	9	1	7	1		0	6	1	13	5	3	2	5	11	0	10	2
19	4	8	5	12	0	1	8	6	0	13	4	8	4	0	4	2	2	0		6	9	3	5	13	5	9	2	8	3	15
20	9	3	3	7	11	7	4	3	7	2	12	5	1	9	7	12	6	6	6		4	7	4	6	8	5	5	4	4	7
21	6	6	15	4	0	9	14	4	2	8	2	13	6	4	11	5	11	1	9	4		2	6	1	15	0	2	13	5	5
22	9	1	0	1	15	6	2	6	9	3	15	1	1	6	2	10	1	13	3	7	2		7	6	1	6	15	0	5	5
23	7	4	2	3	3	2	8	9	3	9	5	5	10	5	2	5	6	5	5	4	6	7		6	4	4	4	3	6	6
24	3	4	1	10	1	1	2	5	5	3	6	5	1	1	3	3	0	3	13	6	1	6	6		4	18	1	5	4	9
25	2	3	21	4	1	6	10	4	5	2	5	16	2	7	18	4	7	2	5	8	15	1	4	4		2	0	12	8	3
26	3	4	0	10	1	3	1	7	8	5	6	3	4	2	2	2	0	5	9	5	0	6	4	18	2		4	4	6	7
27	6	1	0	0	15	5	1	5	10	2	12	2	1	6	2	9	0	11	2	5	2	15	4	1	0	4		0	9	2
28	3	3	12	7	0	7	9	2	4	4	3	12	4	5	11	3	8	0	8	4	13	0	3	5	12	4	0		8	6
29	3	1	3	4	7	8	3	9	10	5	6	10	1	5	9	5	2	10	3	4	5	5	6	4	8	6	9	8		4
30	4	9	2	12	4	3	7	8	1	9	4	3	3	4	2	2	3	2	15	7	5	5	6	9	3	7	2	6	4	

Appendix I. Participation by State

	State	Frequency	%
1	FL	24	0.19
2	IL	13	0.10
3	MI	11	0.09
4	CO	9	0.07
5	NY	8	0.06
6	IA	7	0.05
7	TX	6	0.05
8	OH	5	0.04
9	WY	5	0.04
10	AR	4	0.03
11	IN	3	0.02
12	LA	3	0.02
13	MS	2	0.02
14	MO	2	0.02
15	SC	2	0.02
16	AL	1	0.01
17	KY	1	0.01
18	PA	1	0.01
19	SD	1	0.01
20	VT	1	0.01
21	VA	1	0.01
Multiple states		11	0.09
No Response		8	0.06
Total		129	1.00

Appendix J. Complete Statements Set

#	Statements included in final statement set
1	tracking of hits on each farmers' site so that the value of the service can be determined
2	to develop and deliver educational workshops for local businesses and farmers, to ensure they know about MM and its value
3	financial support to maintain, promote, and utilize the program in Extension activities
4	expanding marketing opportunities and recognitions for businesses in a region or at national level
5	to make the site navigation easier and more focused
6	being part of a state wide Enterprise Resource Planning (ERP) tool with a Point of Sale (POS)
7	to provide MM representatives impact data to prove to Administration that MarketMaker is having an economic impact in the states we serve
8	more capacity developed for use in the classroom
9	the inclusion of all agriculture, forestry, fishing, fishfarming related economic sectors
10	to conduct focus groups with producers and buyers to help identify adoption roadblocks
11	including the state branded logo in the search results and not just posted within the individual profile
12	improved collaboration and "buy in" from core partners
13	to conduct more research concerning how farmers communicate (i.e., are farmers typically willing to use this medium?)
14	meaningful integration of other data (e.g., USDA newly-released directories, OrangePippin.com)
15	adequate staff resources to fully take advantage of technology
16	to help us clean up old data
17	to implement evaluation processes to ensure the site remains relevant
18	easier access to wholesale prices
19	to provide advertising materials to help us market MM (e.g., banners, displays, table covers, flyers, pens)
20	for MM to show up on first page of Google search results for keywords (e.g., fresh, local, organic, market)
21	a franchise model to help states understand how MM can be used, what to expect in terms of costs and benefits, metrics to monitor
22	to include a seasonality chart
23	being a repository of case studies, success stories, and research related to MM (e.g., food hubs, econ dev)

24 promoting more locally grown foods becoming commercially available in major grocery store chains
25 to keep MarketMaker free
26 promoting cottage foods enterprises
27 clearer info from producers (e.g., volume capacity, product availability in terms of pounds, dates available, shipping or distribution options)
28 clearer communication of the long-term goals of the program (e.g., international purchasing capability of registered buyers)
29 to be more regionally focused (i.e., statewide is too large)
30 to have updated blogs and other market announcements, at least on a weekly basis
31 to change the name to something attractive to farmers and people in food industry, so that people can relate it to agriculture or food industry
32 to have product categories that are more relevant, specific, and concise (e.g., free range eggs), but also with definitions in a hover box or glossary
33 to include categories of foodshed infrastructure (e.g., certified kitchens, post-harvest handling & processing facilities, food distribution resources, land)
34 to integrate with USDA 'Know Your Farmer, Know Your Food' program/website
35 a food bank connection program (e.g., the ""donate to a food bank"" option in Georgia)
36 to have a consumer orientation in addition to a producer/buyer orientation (i.e., the consumer site needs to be easier to use than the producer/buyer site)
37 to keep users engaged with email alerts regarding new registrations, listings, or other activities from businesses in their local areas
38 making GAP certified more of a focus on viewed profiles to get the general public thinking about food safety
39 sharing testimonials of impacts for representative stakeholders
40 a way to better serve specific products categories in more detail (e.g., fruit, meats, vegetables, value added, artisan, fish, forestry products, livestock, non-food)
41 a well-understood, consensus-based, plan for moving forward with clearly-defined roles for all
42 to sell advertising space
43 a better linkage to other interfaces that would connect it to the ways consumers and buyers currently search for / sell products and services
44 communication and replication of successful projects & features (e.g., agritourism interface through Clemson)
45 the ability to include more information about products (e.g., what cattle are fed, characteristics of vegetables)
46 to include non-food categories such as personal care, household cleaning etc., as they utilize food grade ingredients (e.g., soaps, lotions)

47 to have an admin option to notify designated users of profiles that have been created (e.g., to those working on outreach, regulatory divisions)
48 to include profiles of nonfood businesses (e.g., ag supplies and farm inputs, livestock genetics, charter boats & guides, garden centers, green houses, wool)
49 to facilitate collaborative and cooperative marketing & distribution options for producers (i.e., to combine sales to reach larger buyer)
50 to implement nationwide promotion efforts coordinated with states, targeted to businesses, farmers, tradeshows, etc.
51 the ability and clarity for users to search multiple terms (e.g., export and corn)
52 to include social media features so it's more like a network and less like a directory (e.g., chat, profile completeness prompts, matchmaking, suggested connections)
53 additional market research capabilities
54 to simplify farmers' market profiles, and include what season they are operating to help clean up old profiles
55 to reduce clutter by eliminating or having a way to filter out all but registrants (e.g., Convenience listed in food and drinking places)
56 to provide optimal routing to multiple locations from a starting point
57 creating or communicating more incentives to participate, to reach a critical mass of people using it
58 e-mail announcements regarding product availability
59 making it mandatory to enter a complete address in a profile
60 a way to download pdf/jpg of the map viewed
61 to keep colors on the state site different from the national site, to help users determine the difference between them
62 the ability for local food organizations to be listed and described
63 the ability to discriminate between different types of buyers and sellers (e.g., institutional, wholesale, retail, direct to consumer)
64 the creation of more educational content
65 to enable ways to access the underlying data depending on the user's perspective (e.g., industry analysis, procurement, regional food systems)
66 a very focused keyword search, including profiles, products, and attributes (e.g., organic, flowers)
67 the ability to hide addresses on profiles
68 helping producers connect with buyers more easily (e.g., restaurant, grocery, schools)
69 being able to see all businesses in a particular zip code / region at one time
70 customizable modules/tabs/portals so states can highlight topics or offer more depth (e.g., related to seafood or "fresh catch", labor, research, food hubs, agritourism)
71 allowing one login for multiple business profiles

72 transactional capability
73 a mobile version or app
74 clear assignment of responsibilities as part of program evolution (i.e., who needs to do what, when, and how?)
75 to revamp the admin side of MM to make it easier to keep state sites updated with fresh content
76 a tool to help gather regional baseline industry data, such as organic vegetable farms
77 the ability to create regional networks (e.g., Google Circles) that can be local, regional, or any scale, and cross borders & state sites
78 for national MM representatives to have frequent contact with university administration with updates on economic impact and partnership
79 to focus on recruiting more produce buyers, especially of small lots (e.g., schools, restaurants)
80 to do a competitor analysis for the site, to inform how to best relate to complimentary and/or competitive offerings
81 a program from Riverside Research to help pilot, test, and model projects using MM (e.g., food hubs, agritourism, foodshed analysis)
82 to provide a consolidated data source for local food systems and to facilitate analysis on local food economies by generating metrics and data
83 a cleaner, more intuitive interface
84 a better understanding of staffing needs at state level, for both core and optional components
85 to make the value proposition clearer so that it is compellingly superior to other alternatives
86 to allow users to save their entry for later submission or automatically save their data after their entry, in case of interruption or internet connection is lost
87 increased transparency between farmers and consumers using verification and certifications
88 getting all states involved
89 easily retrieved monthly stats on usage, completion of transactions, etc.
90 to enhance the buyer/seller forum capacity
91 a good tutorial on the state homepage to tell a user how to use MM

Statements combined with another statement (#) that were included in the final set

92 (80) Do a competitor analysis for the MM site or share with partners if already done.
93 (35) Please add the 'donate to a food bank' option available in Indiana as it is in Georgia. We are the state association of food banks and are always looking for options to purchase Indiana product, particularly surplus or #2.

94 (40) Options to choose from value added, artisanal, different types of fish, forestry products, livestock, etc.
95 (52) prompts to users to complete & update their profile
96 (52) chat function, a la Facebook.
97 (52) match making ability - sort of a match.com for food
98 (48) Add ag supplies, farm inputs
99 (70) inclusion of agritourism options
100 (70) to have a designated "fresh catch" section devoted specifically to local seafood that is currently available
101 (27) On the buyer side, product availability in terms of pounds, dates available, and shipping or distribution options is very important to include
102 (68) the ability to quickly establish connections between local producers and school cafeterias.
103 (52) Less like a directory, more like a network with a profile of customers, etc.
104 (57) reaching a critical mass of people using it
105 (50) Most businesses listed on MarketMaker do not know it. A marketing program should be designed for that audience.
106 (50) Past advertising opportunities have proven very valuable. Would love more and possible tradeshows.
107 (82) food shed analysis, Generate metrics about urban and local agriculture economies.
108 (80) to provide clear direction on how to best relate to complimentary and/or competitive offerings
109 (54) to simplify the Farmer's Markets profile
110 (70) better serve the seafood and charter boat industries by becoming more intuitive for consumers to used to source local seafood and charter boats.
111 (48) the inclusion of ag-related products and services

Statements not included in the final statement set because they were already existing
in the website, had an unclear meaning, or were not specific

112 Would like the state search option to function as the national search function: This would simplify matters.
113 Create a connection function so that registered users will be connected to the National Food MM's, and state partners' admins. They will receive an email alert about this connection to be aware about this function on MarketMaker.
114 Separate by product categories, specifically meat and produce
115 An actual "marketplace" on the MarketMaker. I manufacture organic fertilizer and there is no place on the MarketMaker website to sell anything other than produce or meat. I don't expect a significant response, but just a place to list hardgoods.
116 message board / chat room / community center type capability engaging users

on both ends (combination Craigslist - Reddit - Buzzfeed); could use relevant extension / program publications to support content
117 be a forum for producers offering goods for sale and wholesalers looking to buy
118 Development of long-lasting relationships! It is the relationships that develop that ultimately matter, not the tool. Tools become obsolete. Relationships can endure.
119 Need to work on getting all states involved: Farmers' markets are on the rise. We need to set health and safety standards and closely monitor which chemicals are being used on produce. Food vendors must adhere to health and safety standards.
120 Producer-centered registration procedures
121 Just send people down here to fish with guides and make sure they know that they NEED guides and leave the boats at home!
122 I believe that Market Maker can be improved using the SBIR Entrepreneur Coach
123 Helps to become "top of mind"
124 Looking closely at the Diffusion of Innovations model of technology adoption.
125 Create more options for buyer
126 more aggressive promotions and features that help link other parts of the food value-chain
127 improve producers' connection with consumers, institutions, organizations, other producers in different states, and the most recent research/extension information
128 A Google like search capability
129 being able to customize it more for my needs

Statements that were expressed in other statements in the final set

130 prove the extra benefits or values that go beyond what we are already doing.
131 Allow one login for multiple business profiles: Yes. This would avoid confusion and help consumers with decision making.
132 A link to other databases, such as OrangePippin.com
133 Operate much like an internet dating site
134 The option to chat
135 allow users to save their editing instantly, not going through the whole process again when editing
136 Needs to be more obvious which markets are being targeted (i.e. institutional, wholesale, retail, restaurants, direct to consumer, etc.)
137 From a user in FL: Make the search function work better.
138 Make it more intuitive
139 Make site easier to use
140 Management of keeping farmers/buyers/businesses up-to-date so that those no longer using MM can be removed. Otherwise you are sorting through ones that

possibly no longer exist. There are many on MM that haven't been updated in more than 6 yrs.
141 mobile applications
142 mobile apps
143 More relevant product categories
144 Promote cottage foods enterprises Make the data base easy to clean up. Site should always be as user friendly as possible and not encumbered with old data.
145 Removal of incomplete, outdated, out-of-business profiles
146 The site needs to be easier to access and use
147 Transactions
148 Transactions that take place right within the system
149 Make the data base easy to clean up! Why direct people to a site with old irrelevant data? Site should always be as user friendly as possible and not encumbered with old data.
150 cull inactive listings more regularly.
151 Regular monitoring and publication of web statistics for all member states
152 if people knew about it
153 Increase searchability
154 Look at the Indiana growers Guild page - http://www.localgrowers.org/. Easy to read and use - updated, and notice grocery buyers pull this up to find growers in IN first.
155 Make for user friendly
156 Make the data base easy to clean up! Why direct people to a site with old irrelevant data.
157 Profiles need the option on hiding addresses: Why?
158 Better search options for organic products.
159 Keyword directory search needs to be by product not just in reference to the name of business
160 Making the profiles searchable for key words.
161 a search function for locally-grown cut flowers
162 A product and service offering that is so compellingly superior to other alternatives that it becomes a "no brainer" for all stakeholders.
163 For organic customers, both retail and wholesale, inform them that MM even exist. Make the farmer search options clearer.
164 I am not worried about promoting the MM brand nationally. My concern is servicing consumers within my state -
165 More buyers
166 More widespread participation by all users
167 There needs to be a demonstrated demand for MM. We can develop many profiles, but unless the potential users of MM are aware it even exists ... not very useful. So, I think a focused effort on the existence / benefits of MM is key.

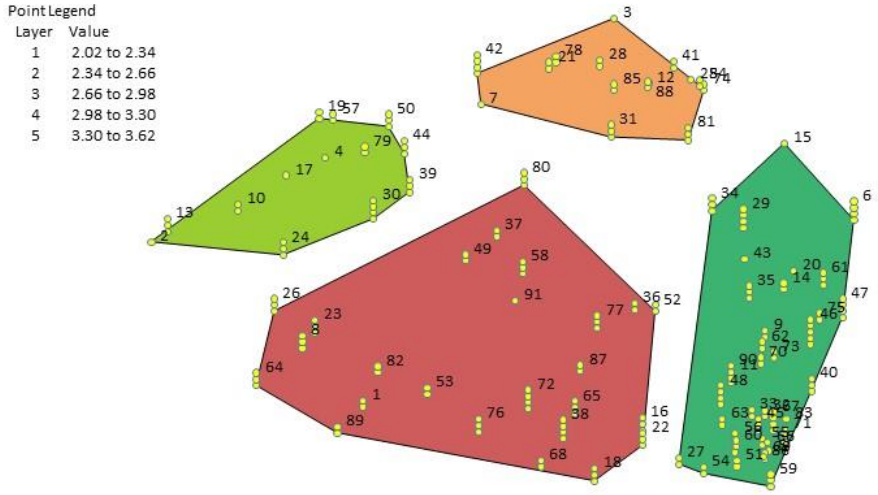
168 have effective marketing strategies to raise awareness about MM, to educate people about MM's benefits, and to make them engaged in using MM.
169 More advertisement. The average person does not know MM exists. The advertising needs to be coordinated at a national level.
170 better visibility to the general public and businesses (more broadly advertised / promoted)
171 organic vegetable market data
172 Regular contacts with business registered
173 A more intuitive user interface
174 Capacity to operate like social media. Consumers and businesses alike use social media to network.
175 Improve method for cleaning up and updating profiles.
176 have less stuff. More isn't always better or easier.
177 User friendly for farmers who often do not communicate this way.
178 MM should serve as a consolidated data source for the local foods systems.
179 for the state search option to function as the national search function
180 Ability to make transactions
181 to act less as a directory and more like a real networking tool
182 Mobile phone friendly interface

Appendix K: Completed Sort on the CSGM website

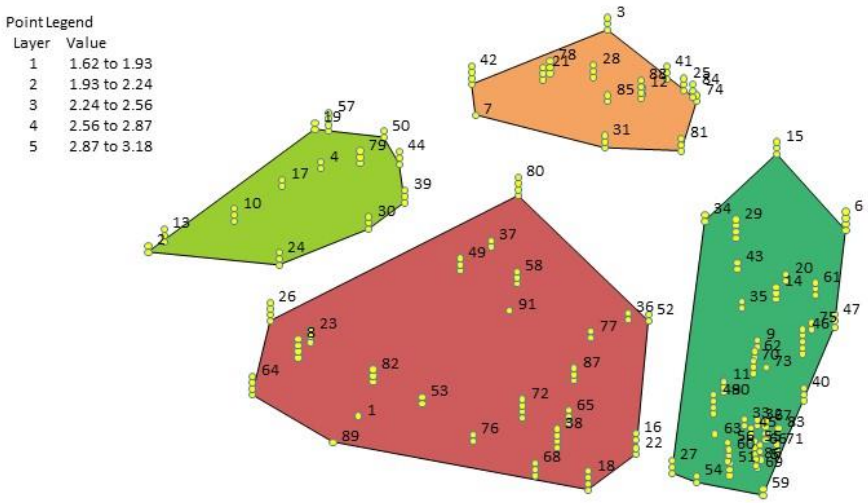
Appendix L. Top Ten Cluster Names Generated by CSGM

Marketing & Evaluation	**Program Support & Resources**
Marketing Marketing In State Promotion Marketing Strategy Total Quality Management - Evaluation and Impact Awareness, Education, and Training Evaluation Outreach of MM Evaluation Research	MM network value Riverside Research National Standard Development Biz Stategies ensuring adequate resources for the service Resources Needed by Consortium Partners State Contracts Financial Sustainability Sustainability Strategies Staffing/Mgmt Need
New Features	**Improvements to Existing Features**
Market Research & Evaluation Learning Tool Producer Focus MM farmer training State Administration Management Research Added Resources/Tools MM as a teaching/learning tool Research Research Capability	website functional Mobile Public Interface (the structure, appearance &functionality of the on-line inter Non-Food Questionable Objectives Profiles Expanding Categories - Areas Profile and Cat Website Customer Engagement / Interface Technology

Appendix M. Point Rating Map – Importance



Appendix N. Point Rating Map - Feasibility



Appendix O. Demographic Response Levels

		All	Importance	Feasibility
What institution are you affiliated with?		122	49	33
	MarketMaker partner organization, Land Grant University, Riverside Research	65	33	25
	For-profit business (producer, processor, wholesaler, distributer, retailer)	38	10	3
	NGO, government	11	3	2
	Other	8	3	3
	No Response	7	0	0
What state do you primarily work in?		121		
Is the region you focus on rural? (The next 2 questions ask about urban and coastal)		119	48	33
	yes	44	13	10
	somewhat	54	26	15
	no	24	9	8
	No Response	10	1	0
Is the region you focus on urban?		117	48	33
	yes	26	10	6
	somewhat	70	32	22
	no	21	6	5
	No Response	12	0	0
Is the region you focus on coastal?		117	48	33
	yes	17	7	6
	somewhat	30	11	5
	no	70	30	22
	No Response	12		0
What is your role?		28	23	20
	State PI	7	7	6
	Researcher	2	2	2
	PAC	6	4	4
	Outreach/Educator/Facilitator	9	7	6
	Tech team	4	3	2
	No Response	101	26	13

Appendix P. Go-Zone Statements with All Ratings of Feasibility

1. tracking of hits on each farmers' site so that the value of the service can be determined
2. to develop and deliver educational workshops for local businesses and farmers, to ensure they know about MM and its value
4. expanding marketing opportunities and recognitions for businesses in a region or at national level
5. to make the site navigation easier and more focused
7. to provide MM representatives impact data to prove to Administration that MarketMaker is having an economic impact in the states we serve
9. the inclusion of all agriculture, forestry, fishing, fishfarming related economic sectors
12. improved collaboration and "buy in" from core partners
17. to implement evaluation processes to ensure the site remains relevant
19. to provide advertising materials to help us market MM (e.g., banners, displays, table covers, flyers, pens)
20. for MM to show up on first page of Google search results for keywords (e.g., fresh, local, organic, market)
32. to have product categories that are more relevant, specific, and concise (e.g., free range eggs), but also with definitions in a hover box or glossary
33. to include categories of foodshed infrasturcture (e.g., certified kitchens, post-harvest handling & processing facilities, food distribution resources, land)
36. to have a consumer orientation in addition to a producer/buyer orientation (i.e., the consumer site needs to be easier to use than the producer/buyer site)
43. a better linkage to other interfaces that would connect it to the ways consumers and buyers currently search for / sell products and services
51. the ability and clarity for users to search multiple terms (e.g., export and corn)
52. to include social media features so it's more like a network and less like a directory (e.g., chat, profile completeness prompts, matchmaking, suggested connections)
54. to simplify farmers' market profiles, and include what season they are operating to help clean up old profiles
60. a way to download pdf/jpg of the map viewed
62. the ability for local food organizations to be listed and described
66. a very focused keyword search, including profiles, products, and attributes (e.g., organic, flowers)
69. being able to see all businesses in a particular zip code / region at one time
73. a mobile version or app
74. clear assignment of responsibilities as part of program evolution (i.e., who needs

to do what, when, and how?)
75. to revamp the admin side of MM to make it easier to keep state sites updated with fresh content
78. for national MM representatives to have frequent contact with university administration with updates on economic impact and partnership
83. a cleaner, more intuitive interface
85. to make the value proposition clearer so that it is compellingly superior to other alternatives
86. to allow users to save their entry for later submission or automatically save their data after their entry, in case of interruption or internet connection is lost
89. easily retrieved monthly stats on usage, completion of transactions, etc
91. a good tutorial on the state homepage to tell a user how to use MM

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